Making each and every farmer count

Participation in agricultural engineering projects

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Making each and every farmer count

Participation in agricultural engineering projects

Edited by Megan Lloyd-Laney

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Foreword

Agricultural engineering is traditionally viewed as a male dominated technical discipline. In farming practice it turns out that much, if not most, of the field work (including the use of numerous tools and pieces of equipment) is managed and carried out by female farmers. Despite this, a lot of male agricultural engineers acting in their capacity as project practitioners, extensionists, researchers or policy makers, are not prepared to approach and work with women farmers. Therefore, the intention of the booklet is to provide middle and senior-level agricultural engineers, researchers and project practitioners with basic information, examples and ways in which issues on gender and participation in engineering and technology projects may be tackled.

The initial idea for the booklet was born in 1996 after a workshop on 'Gender and Agricultural Engineering', organised by AGROTEC (Agricultural Technology for Small Farmers in Central and Southern Africa - a Swedish (SIDA) funded project which was amalgamated into FARMESA in 1996) and FAO in Kadoma, Zimbabwe. During that workshop the need for more and better examples and ways in which engineers and technicians could work more effectively with women farmers was identified. Male agricultural engineers complained that there are very few good literature sources available which provide useful and practical information on the subject and which are specifically written for technicians and engineers. As a result, the idea to produce this booklet and poster was born. The idea has now become a reality after twelve months of intensive investigation into the participation of men and women in the areas of agricultural engineering and mechanical technology. This booklet is the result. Funding has been provided by the FAO Agricultural Engineering Branch (AGSE) together with the SIDA funded, FAO field programme FARMESA (Farm-Level Applied Research Methods for East and Southern Africa - a regional smallholder development programme, operating in Uganda, Kenya, Tanzania, Zambia and Zimbabwe with the Co-ordinating Unit based in Harare). A large number of people have participated in its production: special mention to Zimbabwean designers Myrtle Mallis and Aymie Panis-Jones, cartoonist Jeffrey Milanzi, photographer Calvin Dondo, and Saskia Everts from Toolconsult, the Netherlands. The main task of writing and editing the booklet has been carried out by Megan Lloyd-Laney who managed the co-ordination and production process in Harare for Comms Consult. She has been ably supported by Josef Kienzle of the Agricultural Engineering Branch of FAO and Katja Jassey of FARMESA. AGSE and FARMESA hope that the readers will enjoy the booklet and poster and that the booklet will make communication on gender and participation in engineering technology easier. It is also hoped that it can provide some fun as the subject is often taken too seriously by all!

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Introduction

For most African agricultural engineers working in development, there is nothing new in the objective 'to make each and every farmer count'. Most development workers are quite committed to this goal. It is rarely a project's intention that only a few farmers benefit from its interventions, while others lag behind or become even more disadvantaged because of such development.

Experienced agricultural engineers are familiar with the many stories of development interventions which have only benefited the rich farmers, and have not reached the poor; that have reached the land owners, but not the landless; that have helped the urban people, but have left behind the rural population; and that have reached men, but bypassed the women. Nowadays, most development workers are committed to changing this inequality of impact in their own projects.

And yet, in the daily practice of this extremely complicated line of work called development, making each and every farmer count turns out to be a very difficult task to tackle. Time and time again, it turns out to be a more complicated goal to reach than had been foreseen. Other project objectives seem to get in the way of achieving this general objective. This booklet is an attempt to address this dilemma. Specifically, the booklet is concerned with the possibilities and impossibilities of reaching both men and women farmers.

Evidence seems to indicate that at present, it is still easier to reach male farmers with development activities, than to cater for the needs of women farmers. Women tend to be left behind. So what? Is this actually a problem? If it is a problem, is it one which agricultural engineers can do something about? Is it really worth spending more time on, given all the other pressures and requirements that development workers have to deal with? If we do try harder to reach women, how realistic is it to realise our other project objectives at the same time?

In other words, if my project objective is to increase food security, then how legitimate is it to spend a lot of time reaching some other objective such as benefiting more women farmers just to please the donor?

Many conscientious development staff are grappling with these and similar questions when they are confronted with what has become known as gender issues. This booklet will try to give some answers to such questions.

The Gender Booklet: meeting engineers' needs for information

During an FAO/FARMESA regional workshop which was held in the United Republic of Tanzania in October 1996, practitioners engaged in agricultural engineering projects or research were asked to be frank about how much they knew about gender issues and how far these issues were being addressed in their day-to-day work. They were asked to outline the techniques which they employed to meet gender objectives and what sort of information or guidance was missing which the proposed Gender Booklet might be able to fill.

Agricultural engineers who are working in development projects understand a lot more than people think about why farmers do not, or cannot, involve themselves in projects.

The picture painted by the engineers was one of fatigue and frustration: fatigue at being repeatedly told that they are not doing enough to incorporate gender needs into their projects and frustration because very little practical assistance is being offered as to how they might go about doing this themselves, even if they wanted to. The picture they painted has been used in the production of the Gender Booklet to try to answer some of their specific questions about case studies which have succeeded and failed in this attempt. From the interviews, it emerged that agricultural engineers who are working in development projects understand a lot more than people think about why farmers do not, or cannot, involve themselves in projects. Many of them also understand that the needs and constraints of farmers within a community are different according to what sex and what age they are; how wealthy they are and what status they are given by their peers within the community. Given this understanding, why then is it that agricultural engineering projects often do not achieve their objectives of greater uptake of better tools and techniques by these communities?

Many of the engineers working in these projects complain that information about what practical steps to take to overcome such constraints, or to respond to farmers' different needs and views of technology use, is often missing. They complain that there is plenty of information about what they are doing wrong, but little which helps them to correct their mistakes. All too often, information about the methods which might work in a practical, project context, are not accessible to practitioners or are not available at the right time.

Of the 19 engineers interviewed, very few had access to gender specialists in their own organisations or departments, and no more than three had received explicit gender training. Not everyone felt that such training would be helpful in achieving their project objectives, and some believed that isolating gender as an area of focus apart from other priority issues, such as poverty, was doing more harm than good. One engineer said that the training they had received from a woman 'was biased'. He did not think that this bias was necessarily a bad thing 'because it made the men aware of the extreme differences of perception of men and women'. But he did conclude that in general, men will 'move' more in their thinking about gender if they are sensitised by men rather than by women.

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Information which allows engineers to respond to farmers' different needs and views of technology use is missing

There was some recognition that the unconventional approach often leads to success. One engineer described a health project which identified, through PRA techniques, that the people wanted to have a playground rather than the project's preference for a clinic. The project went ahead with the construction of a clinic anyway, and were disappointed to find very little support for it from the community. Finally, they embarked on the construction of a playground which, when completed, resulted in a number of injuries. The community, seeing that their children were being hurt and there was nowhere to treat their injuries, saw the importance of a clinic and participated fully in its implementation.

Engineers talked about the social and contextual reasons why their project interventions didn't reach all members of the community. "A lot of the time, uptake of technology doesn't happen for cultural reasons. For example, women find it difficult to attend training workshops if the man in the house - the head of the household - doesn't allow her to go", said one engineer. Another described how land tenure systems, particularly in this part of Africa, constrain women's access to, and control over land. But this interviewee didn't recognise that the projects themselves might need to liaise with others working on issues of land tenure reform to bring about greater access and control of women, in order to increase their participation in agricultural engineering projects.

Where there was recognition of the constraints which inhibit women's participation in projects, engineers complained that the resources did not exist to adequately address them. Practitioners said, for example, that "women do not have access to basic information about farming tools and equipment which would be appropriate for their

Women do not have access to the basic information which would be appropriate for their farming activities

Process Initiation
Awareness raising at Community Level
- problem + needs identification
- TTT
- PRA
- ZOPP
- planning
- clarification of roles + expectations
Exposure to options
- Create awareness for technological options
- initiate 'kuturaya' process + competition
Tools
Support System
Role of research
Role of extension
- active promotion of options
- facilitation of process but at which stage
- Support farmers in experimentation, evaluation + planning
to
an

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farming activities; and they do not have access to repair shops when their tools break down and need fixing", but they did not design activities which would address these problems of access, either because their project didn't have the necessary expertise or the time to do so. In most cases, practitioners complained that the resources were not available to engage the necessary skills, either from inside their own institution or externally, to address these issues. It was only the minority who had received any sort of dedicated gender specialist support in their projects.

The majority of the participants of the FAO/FARMESA workshop who were interviewed welcomed the idea of a Gender Booklet. They warned that they would not read it if it tried to lecture them, or it presented them with yet another theoretical discussion about why it's important to include everyone in your project. What they wanted was real-life examples drawn from their own region - Africa, preferably south and east - and with at least one example from their own specialist field included in the case studies. They wanted the language of the stories to be kept simple and descriptive, with explanations of what techniques had been tried by people like them in situations like the ones in which they were working, and with what impact. Then, they would be able to select what information was relevant and appropriate for their own contexts and turn it into practical actions to better meet project objectives. We hope that the Gender Booklet has satisfied at least some of these expectations and that it achieves its own objective of influencing practitioners to make a difference in their own work.

Structure of the Gender Booklet

The booklet will explore gender issues in agricultural engineering by presenting actual working practices which have been, and are taking place in Africa, all but one of them in east and southern Africa. Six case studies describe practical projects in the region: projects that are managed by African agricultural engineers; projects that have struggled with their commitment to make each and every farmer count. Some of the projects described are more successful in terms of reaching more people with tangible benefits, and others are less successful, but all of them have gone through important learning processes about how to include gender in project design and implementation.

The booklet's subject is a serious one, but attempts have been made to present the content in an entertaining way, for example by highlighting some common issues in cartoon strips and using anecdotes to illustrate certain approaches within the project context. A joke can be appropriate, even when discussing gender issues! A separate full colour poster, which features two cartoon strips, is included as an integral part of the booklet. The subject of each cartoon is drawn from real-life situations which are described in greater detail elsewhere in the Gender Booklet.

We hope that readers will pull out the poster and put it somewhere on the walls of their own office or institution where others may read it. We hope that the cartoon will not only intrigue people and make them want to know more about the subject matter, but will make them smile in recognition of similar situations in which they may have been involved.

Extra copies of the poster have been printed and could be made available to readers who can place them where other agricultural engineers may be able to see them. For more information and copies, write to the Agricultural Engineering Branch of the Food and Agriculture Organization of the United Nations, Viale delle Terme di Caracalla, 00100, Rome, Italy.

A glossary has been included, which contains

Attention for gender relations is a condition for successful development interventions but it is no guarantee. When approaching women farmers to participate in the process of technology development, it is important to realise that not only the attitude of the extension officer or scientist influences the validity of the findings. The following example shows that women, when invited to give their opinion about some new equipment, do not necessarily tell the truth, for various reasons.

In many parts of sub-Saharan Africa, women spend much time processing millet and sorghum. Pounding of the grain to remove the outer hulls is needed before it can be ground either with stones or in a mill. For maize there are electric or diesel mills available for most people, but mechanical dehulling of small grains is more problematic, and dehullers are rare.

In a communal area in Zimbabwe where research into gender relations in farming systems is being carried out, an experiment was organised with a manual dehulting and grinding implement which is being developed by the Development Technology Centre (DTC) at the University of Zimbabwe. Three scientists from the DTC brought the grinder to the rural area where a number of women farmers were testing it in a yard, all members of one group. The women were very enthusiastic about the experiment as such, and this was confused with enthusiasm about the grinder.

During the experiment, when asked what they thought about the work, they said it was not heavy, and even nice work to turn the handle. They did not let the fact that very little meal was produced spoil their enjoyable day. The women who were not used to much attention, particularly not from gentlemen from the capital, Harare, expressed their gratitude with singing and dancing. It would have been very impolite to express any negative opinions about the machine.

The technical scientists wanted to find out how the women work with the grinder and how the grinder functions in the field, dehulling small grains and grinding them. They were intereested in the opinion of the women because in the end it is the women such as these farmers who will have to work with the grinders. Although the scientists from the DTC were of course pleased to hear all the compliments, they tried to discover what adaptations were still to be made. During the experiment they also could see that the meal came out very slowly, but the enthusiasm of the women convinced them that the opposite was true. They all expressed their wish to purchase such a grinder as a group or as an individual, if only they had some money.

During the following days, the women felt more comfortable to include some interesting points of critique about the machine but by then, the scientists had returned to Harare and could not hear them. Even though they should be given credit for making the effort to come a long way with the grinder, the scientists and designers were not rewarded with valid information but with gratitude and politeness, as they should be according to the prevailing gender ideology. This perhaps highlights the difficulty of engaging real participation in technology design and adaptation.

Joke Muylwijk, 1997

some of the terms which are so often used in gender discussion but whose meanings are not always quite clear – like the word gender itself. The glossary intends to clarify what these terms mean, as well as to present the language of the broader gender debate for readers so that they may be able to participate more fully in future discussions.

The booklet will not make you into a fully fledged gender specialist. Plenty of other books exist which contain more practical methods and guidelines for those of you wanting to become a specialist in this field: some of these are listed in a 'further reading' list at the back of the booklet. What the booklet does intend to show is whether you – an agricultural engineer who is committed to 'making each and every farmer count' – should or should not be actively interested in gender. ●

1

Making a difference where it's due

by Saskia Everts

As said in the Introduction, all conscientious agricultural engineers would like to see their work benefit all farmers, not just the easier-to-reach subgroups such as the rich farmers, or the male farmers. It could be said therefore that agricultural engineers don't want to 'make a difference'. This can lead to the view articulated by one engineer as follows: "I think the issue of gender and engineering is very important. However, I think that for me personally it is not very relevant, since in my work we don't make a difference between men and women, because we work for all farmers."

Such a claim, however, confuses two kinds of making a difference. On the one hand there is making a difference with regard to the project target (all farmers), and on the other hand there is making a difference with regard to how the project should approach its target groups (differentiating the approach).

The paradox is that, if we want equally positive results for all farmers, we have to make a difference in how we approach the different groups of farmers. It is just because *we don't want to make a difference* that we *have* to make a difference where it's due.

All of the case studies in this booklet show that when a project did not make a difference in its approach, or differentiate between the different people co-existing in the community - that is it paid no specific attention to women, nor to the differences that society has ascribed to men and women – the project did not succeed in reaching men and women equally. So, for example, when information on improved cultivation techniques is written down and distributed in fertiliser distribution centres, no one intends to disadvantage women. Yet the result of this 'non-discriminatory' approach is discrimination against women. Because women are often less literate than their male counterparts, and because they are far away and may not normally visit these distribution centres.

Or, for example, when a male engineer calls upon a group of farmers to ask them about their needs and priorities, without making a difference between men and women farmers, the chances are ten to one that he will be answered by the male farmers. What he will be told are the priorities of the men, which are usually different from those of the women.

This paradox, that if you don't want to make a difference between men and women, you have to make a difference where it's due, is of course caused by the fact that the social starting positions of men and women differ. While women are not supposed to travel far, and cannot easily do so because of their child care responsibilities, most societies allow men to travel without restriction. While women have learned to keep quiet in meetings, and have developed a low level of self-confidence, men have been taught to speak up, and usually feel quite convinced that they have something important to say.

But all known societies do make some kind of differentiation between men and women, and this differentiation will almost always have a great deal of influence on any agricultural development intervention.

Such differences are part of the 'baseline' situation in which agricultural engineers plan their interventions. Just like any other aspect of the baseline situation, the differences between men and women must be known in order to design appropriate development projects. An engineer who wants to effect change, such as introduce improved cultivation methods, or promote animal traction, can then consider these different starting positions strategically. He or she can see what are the constraints and deal with them, and look for the opportunities in order to exploit them.

What is gender?

When talking about the differences between men and women, the word gender is often used. Gender is a shorthand way of referring to the different roles that society assigns to men and women, and to the (power) relations between men and women. The actual contents of these gender roles vary from society to society. For example, in some countries, women are not allowed to be near or work with cows whereas in other countries the task of cow-herding is specifically seen as a women's task. This variation is one of the things that makes dealing with gender issues so difficult and challenging! One never knows beforehand, and can never assume from past experience, what the gender situation will be in the village where one's project will be implemented. But all known societies do make some kind of differentiation between men and women, and this differentiation will almost always have a great deal of influence on any agricultural development intervention.

Two kinds of arguments for taking gender into account

What are the advantages of taking gender into account? And more important, what are the implications of ignoring gender issues? Reading the case studies included in the Gender Booklet, you will soon discover that most projects had trouble in taking gender into account when they first started, and this posed two sets of problems. Both kinds of problems set the projects back in meeting their objectives and no practitioner would knowingly want to encounter such setbacks in their own projects: they therefore demonstrate strong arguments for taking gender issues into account from the beginning. The first argument we can call an instrumental argument, and the second a fairness argument.

(a) The instrumental argument

Some projects were not successful in reaching their basic objectives. For example in Kenya, the maize storage structure was never successfully disseminated because the background situation was not well considered in the project design (including the social differences between men and women which were important and relevant to the project's objectives). Because of its disregard of gender, the project neither made use of the opportunities that gender provided, nor dealt with the constraints caused by gender. We may conclude that one important reason why gender should be included in projects is because without its consideration, the project might well be less effective than it could otherwise be.

(b) The fairness argument

In other cases, projects which ignore gender still seem to accomplish what they set out to do (for example, increase the use of animal traction for smallholder farming systems). However, when looking more closely at the impact of such projects, it can be seen that this objective was only reached for male farmers, while female farmers were left behind. In some cases, the situation of

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In most parts of Africa, women are responsible for household food security: it is vital therefore that they be included in agricultural development projects

Agricultural engineers want information about techniques which have succeeded in making each and every farmer count

women actually worsens as a result of the project intervention. For most practitioners witnessing such a trend, this would not appeal to their idea of fairness. Why should only one group benefit? Isn't the situation of women as difficult, and as much in need of improvement as for their male counterparts? If we look closely at real life and compare, women's problems are very often greater than those of men. This fairness argument then might inspire development workers to take account of gender, so that they can design a strategy that ensures that when improvements are achieved, both men and women benefit.

Some development workers would say that if a project achieves its objectives, but only for men, one should say that the project objectives were not met at all. Because even if project objectives don't say explicitly that both men and women should be reached, shouldn't we believe that implicitly, this is always an objective of development? Development is not development if it only develops half of the people.

Ways of taking gender into account

The case studies show that most projects did not succeed in taking gender into account from the very beginning. Yet they also show that most projects did manage to readjust their strategy. Through the strategic changes initiated, the projects became quite beneficial to women as well as to men. The lesson is that taking gender into account is not easy. Although there are quite a few useful instruments that agricultural engineers can use (see the *Further reading* section at the back of the book), each project will remain an experiment and a learning process. There are, however, a few golden rules which are useful to follow in order to avoid the more obvious and dangerous mistakes, and these are reflected again and again in the case studies.

The readjustments that lead to projects that reach each and every farmer all have to do with:

- participation of both women and men;
- recognising and respecting the existing situation, including the gender situation;
- respecting and drawing upon existing (non-formal) knowledge of each and every farmer;
- recognising that technological change has to take notice of both the technology 'software' as well as the technology 'hardware': often the former is more important in realising long-term project objectives than the latter.

To the experienced development worker, these golden rules may not sound new. But how to put them into practice and make them work for women? The best way to get a feel for this is through the experience of other engineers who have been struggling with this in different countries in Africa. The case studies in this booklet illustrate the way the golden rules figure in the practice of making each and every farmer count. ●

Glossary

Gender

'The differentiation that a society makes between men and women.'

The nature of this differentiation varies between societies, but every society exercises some form of differentiation between men and women. It is visible in the different roles and tasks that men and women have; their different access to resources; their different identities.

In almost all cases, these are not 'neutral' differences, but also imply 'inequity', i.e. women as a group have fewer options, less power and status, and fewer resources than men.

Gender is not the only type of differentiation that exists in societies: race, age, wealth and caste are examples of others.

Gender needs of women; gender needs of men

'The needs of women and of men.'

When these are called 'gender needs', instead of just 'needs', this is to indicate that such needs are partly determined by gender (by the differentiation that a society makes between men and women).

Practical gender needs

'The needs that women have, because of their social position.'

Strategic gender needs

'The needs that women have to improve their social position.'

Some projects mainly address the 'practical' gender needs of women: these projects work within the existing gender relations, and do not question or seek to change them. For example when women are taught how to make better and more nourishing meals, this mainly addresses a practical need, and recognises and reinforces the fact that women are responsible for meals and for family health without challenging these responsibilities. But when a project tries explicitly to bring about women's greater control over family income, this is an effort to strengthen women's social position, and addresses a strategic gender need.

Women in Development (WID)

'A strategy to integrate women in development.'

Gender and Development (GAD)

'A strategy to base development interventions on an analysis of the different roles and needs of men and women, in order to improve the social position of women.'

WID was the prevalent term until the 1980s. It was superseded by GAD which included a change of focus from concentrating only on women to understanding the broader concept of gender. The GAD approach also tried to understand the patterns of differentiation between men and women including the power relations between them. The GAD approach brought men more into the picture of analysis within development.

Participation

'Not so much a question of skills in using the right techniques, but more an awareness that local women and men can make an important contribution to planned development efforts, if only they are invited to take part in the analysis concerning important matters in their lives.'

Gender sensitive

'Sensitive to the fact that the social differentiation between men and women strongly determines women's (and men's) lives - generally to the disadvantage of women - and also influences the way interventions will work out for men and women.'

Integrating gender

'Using knowledge about the social differentiation between men and women in the design and implementation of interventions, in order to foresee the needs of women as well as men.'

Participatory Technology Development (PTD)

'PTD in agriculture is a process of interaction between local people and outside facilitators to develop more sustainable farming systems.'

It starts with a joint analysis of the situation, an activity commonly known as Participatory Rural Appraisal. It continues by including participatory planning, implementation, monitoring and evaluation of local development activities. The key to PTD is experimentation with new ideas designed and conducted by farmers with the encouragement of PTD practitioners.

2

A plough for every household

The story of the Kebkabeiya Smallholder Project in the Sudan

Kebkabeiya is a semi-arid region located in the southwest part of Northern Darfur state. The Kebkabeiya Smallholder Project (KSP) was initiated by Oxfam in 1985 to deliver relief support following the 1984-85 drought. While continuing its relief activities, Oxfam began a rehabilitation and development programme, with the aim of empowering approximately 10,000 households that make up the Kebkabeiya community, and strengthening the position of the poor farmers through increased food security and control over their available resources.

There were four parts to the development programme: animal health and nutrition; agricultural development; women in development; and animal traction with relevant extension services. This case study explores the activities and impact of the animal traction component, which was implemented by the Intermediate Technology Development Group (IT). The case study argues that the key to successful technology uptake is an alternative approach that attempts to minimise the control of professionals and other external agents, and maximises the control of manufacturers and end users. Definitive methodologies are not themselves the key to developing more participative ways of working but rather the attitude of professionals and the weight given to technology software (skills, knowledge and forms of social organisation) compared to hardware (techniques and equipment).

Background to the project

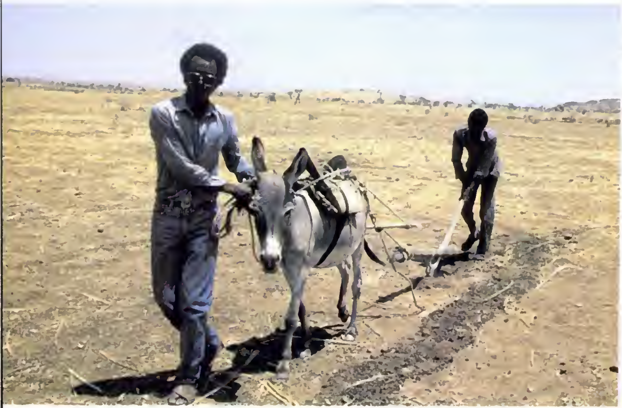
Kebkabeiya is an arid area, receiving average rainfall of 350mm annually, although since the mid-1980s periodic droughts have been common. It is inhabited by tribes of both Arab and non-Arab peoples, but dominated by the non-Arab Fur tribe both numerically and in terms of the agricultural economy which is dominated by small-scale, rainfed, subsistence farming. Each household farms between 2-4 plots of land of between 2-10 Mukhamas (MKs) each: one Mukhama is approximately 1.8 acres.

Soils are hard-top, sandy loam soils, known as goz, and farmers work the land with hand tools. Millet is the most commonly planted crop, inhabiting up to 80% of cultivated land, along with groundnuts, cow peas, okra, water melons and some legumes.

The household is the most common unit of production for farming and men and women share the agricultural tasks, although women are responsible for 90% of all agricultural operations because they have responsibility for family sustenance, unlike in most other parts of the Sudan. Forty percent of all households are headed by women, due to a number of factors including men's involvement in the Fur army; their movement elsewhere to find work; polygamy and divorce. While all of the farmers in this area are considered to be 'poor' using criteria of material assets; livestock ownership; employment options; access to food; social deprivation and size of families; the very poorest households are the ones headed by women.

Introducing animal traction

Farmers identified early on in the project that one of the main constraints to greater food production was primary cultivation, i.e. ploughing; planting and first weeding. Some affluent wadi farmers who had seen a camel-drawn plough being used in southern Darfur tried this implement in their



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Soils are hard-top, sandy loam soils, known as goz

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The idea of a donkey-drawn plough was laughed at by some farmers, but those who could afford it were happy to use it

area, but it was unpopular because camels were vulnerable to bandits. The projects which introduced these ploughs concentrated on technical design rather than dissemination of the implement and it was therefore not taken up widely. Since nearly four-fifths of households in the project area owned donkeys - there are an estimated 30,000 in the community - the project staff came up with the idea of a donkey plough.

IT conducted a survey of plough users and producers in 1988, drawing on the experiences of two projects which had been ongoing in southern Darfur since the 1970s. A steel mouldboard plough was developed and tested with farmers in the project area. It was modified in response to feedback and became known as the Kebkabeiya plough. Although the idea of a donkey drawing a plough was laughed at by some farmers in the beginning, those farmers who could afford this plough were happy with it, but work continued on a lower-cost, wooden option in response to needs of the poorer farmers.

Farmers were invited to use the Kebkabeiya plough and make comments on it at demonstration sites set up in the project area, and as a result of their comments, specifically to do with inadequate ridging, landside length and adjustment, technical modifications were made and a new design was introduced in 1993 which farmers found stronger with a mouldboard that did not twist when it was used on hard ground. This was still found to be expensive, and a further technology option was introduced in 1993 called an ard, based on a tool which had been used for thousands of years by farmers in the Nile Valley. Its advantage was that it only used steel for the share and was therefore cheaper to make and lighter to use than the Kebkabeiya plough. Two more modifications of the same design were introduced and tested by farmers.

What actually happened?

Uptake of the plough in 1991 was low and perception of the Kebkabeiya plough was negative where people knew about it at all. Information was disseminated through the project extension officer, the demonstration sites and through village committees but this network was neither sufficient to reach all farmers, nor comprehensive in the information it issued, leaving farmers unsure of the advantages of the plough over their traditional methods of preparing the land. Distribution of the ploughs was only through the committees of each centre - of which there were 14 in total, each of them representing between 5-7 villages - and the spread of the ploughs was influenced by the enthusiasm and the wealth of these different centres. In the beginning it was only the richer farmers who found out about and could afford to take up the plough.

Two years later, the demand had risen dramatically, with only three centres receiving a demand for more than 700 ploughs. Poorer households, the specific target of the project, began to demand access to the plough: one farmer from Jerai village said "We are poor and we need the plough. Yes, we don't have a donkey to draw it but we can at least bend on our knees and draw it. My wife can hold the plough and I will pull it."

A member of one of the Project Management Committees (PMCs) described the process of farmers accepting the plough. "The plough started as a gift: some farmers saw it on the demonstration farm but they were afraid to use it because it was an untried implement. The rainy season is once a year only and it is difficult to risk it." The farmers were afraid that if they used the plough and there were problems using it, that they would 'waste' the first rains and that would be the entire season lost to them. "In 1993, everybody demanded the plough at the same time: they had seen how it worked for other farmers and the project had a problem to meet this demand", said the PMC member. This sudden growth in demand was probably stimulated by more farmers having the opportunity to see neighbouring farmers try out and use the plough.

Impact of the plough

An external evaluation of the project in 1994, which gathered information and farmer perceptions of the project, described the significant advantages brought about by the plough. These included an observable improvement in water conservation, infiltration and the soil's water carrying capacity; a dramatic reduction in the number of first weeds, and to a less extent in second and third weeding; easier land preparation and sowing operations; and reduced number of pests. As a result of more

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Experiments with various designs of plough were initially conducted on demonstration plots

water being retained in the soil, crops showed greater tolerance to droughts over periods of three weeks and longer, compared to a maximum seven days' resistance of soils worked by hand tools.

Farmers using the plough were able to cultivate larger areas of land than those not using the plough: in some cases this increase was more than 100%. Farmers were choosing to rotate crops and leave land fallow, and were beginning to introduce a wider diversity of crops on their land including cash crops such as groundnuts, okra and cucumber. There was also evidence of better field management because of the time saved by using the plough for primary preparation. Poorer farmers benefited particularly from the introduction of the plough because they could bring under cultivation land which they previously did not have the labour to work. Farmers reported time saved was being used in petty trading, wage labour and wood collection for income generation.

Productivity on land which had previously been cultivated using hand tools increased by more than double in the years immediately after plough adoption. In 1994, a year of particularly bad rains, the average sized piece of land (2MKs) under cultivation with a boutine (a traditional hand hoe used in the region) yielded 0.1 sacks of grain: the same land under the plough yielded an average of three sacks of grain. (Food consumption of an average household containing six people is between 5-6 sacks of grain in one year, assuming that the family members eat two meals a day.)

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The project worked with blacksmiths to stimulate local production of the improved ploughs

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Nomadic artisans were trained to provide mobile repair and sharpening services to farmers

Interviews with the poor, women-headed households revealed that the 10-12 days it used to take them to prepare the land with hand hoes, had been reduced to two days with the plough. In addition, they had learned valuable skills such as contour ploughing, and water harvesting techniques as part of the extension package which they would not otherwise have gained. The most important benefit of the plough, according to the women, was the reduction in back pain, fatigue and general drudgery work. The extra time was used to cultivate other crops for family consumption and for sale and this resulted in better household nutrition; an improvement in family income; more time spent on child care; and greater involvement in other skills development such as literacy.

The indicators of severe hardship which normally accompany a bad year, such as women migrating to the Libyan Arab Jamahiriya or elsewhere within the Sudan to find work, without sending remittances home, were absent in the households using ploughs.

Because the project explicitly targeted women farmers as equal recipients of the plough technology, their standing in the community shifted, according to the women interviewed for the evaluation. It gave them moral support and confidence, and this may account for their increased recognition and role at a household and village level. Their involvement in the village project structures gave them a voice and a forum to express their concerns and their ambitions. Once the women farmers had access to information about the different technology options, their use and related extension messages, both poor men and women farmers reported an increase in knowledge and confidence to be able to make decisions about possible uptake and conditions of uptake.

Whereas previously women kept away and actively hid from community activities such as committee meetings, those that became part of the project have sought out the forums for information exchange and take an active part with their men counterpart farmers.

Productivity on land which had previously been cultivated using hand tools increased by more than double.

Strategies for reaching the poor

Project staff recognised that they could only encourage technology adaptation and adoption by respecting the ways in which the farmers themselves wanted to work and chose to accept or reject the new technology. Any methodological approach which had the potential to increase farmers' control over project activities was therefore utilised by the project. Often these approaches were read about in books, or heard about from other practitioners, and many of the earlier methods, such as Rapid Rural Appraisal (RRA) survey techniques were more extractive than participatory, but the project staff learned as they went along, and listened to the farmers' feedback on their approach. The approach was respectful enough of farmers' knowledge and skills to break down the dangerous barriers between those implementing the project and its beneficiaries. This is not to say that the development of an atmosphere of research conducted by farmers and blacksmiths was easy to achieve: it was not a rapid process but it did develop over time. Some specific approaches can be highlighted:

Livestock ownership patterns were closely analysed at the outset of the project, and an agricultural tool which could be accessed by even the poorest members was chosen for development - hence the donkey plough was developed because donkeys are commonly found in most households.

Key appointments were made with a view to reaching the traditionally 'silent and invisible' members of the community. For example, a woman field officer was recruited to work with and respond to the needs of women farmers alongside her male counterpart field officer. A women's committee was set up in each village to ensure that they had a voice in the decisions being made and the benefits arising out of the project. Representation of each committee on the central Project Management Committee included equal numbers of men and women. Quotas were set within each centre to ensure that ploughs were allocated equally to all sections of the community and not just the most persuasive or wealthy. Special credit arrangements were made available for women to encourage them to buy their own ploughs, but despite this the Fur women were slow to take up the offer for fear of defaulting on repayments.

The project benefited from being one strand of a larger development project carried out by Oxfam in close conjunction with the Kebkabeiya

Smallholder Charity Society (KSCS). Poorer members of the community were therefore active in, and strengthened by the other project activities such as literacy classes, credit loans for small businesses and agricultural extension targeted specifically at women. These activities, running in parallel with the Animal Traction project, raised the confidence and assertiveness of the poorer members and encouraged them to articulate their needs and help identify solutions concerning their agricultural activities.

...money is better spent on the 'software' side of technology development, i.e. the knowledge, skills and social organisation...

For example, as part of the 'Women in Development' component, ten women were trained to deliver extension services and they worked in close collaboration with the women's committees to reach women and men farmers. In the Agricultural Development component, Village Extension Agents were chosen to represent the members of the community whom they were to service. Two women extension co-ordinators were recruited to monitor and strengthen extension to women farmers. The early recruitment of women with formal qualifications from outside of the project area proved less successful than the subsequent recruitment of local, Fur-speaking women as project officers.

Because the project wanted the supply and repair of the tools to be controlled within Kebkabeiya, IT worked with blacksmiths from a sub-ethnic group of the Zaghaa peoples called the Hadaheed, to produce the tools. These are amongst the most marginalised groups living in Darfur. In the beginning, seven blacksmiths were chosen for training in Nyala, a large town nearby, where an artisan who had a plough manufacturing business provided the training. Later in the project, another 10 blacksmiths were trained: these are nomadic peoples who travel around repairing tools, sharpening blades, etc.

An integral part of the strategy to achieve greater food security and control over resources was the establishment and strengthening of community structures to manage ongoing project activities. Project Management Committees (PMCs) were formed by the people with an overall committee to oversee and co-ordinate their activities. The overall PMC was registered as the Kebkabeiya Smallholder Charity Society in 1990.

Conclusion and project lessons

The recognised success of the animal traction work in Kebkabeiya owes a great deal to an approach which, over time, enabled farmers and manufacturers to control and manage the technology development process. The technical issues turned out to be less important than the ways in which outsiders were able to foster an environment in which experimentation by farmers and manufacturers were valued and where key decisions were made by farmers. The specifics of methodology were less crucial to success than adopting an appropriate mindset. This has great implications for both resources and the role of engineers and technicians. It implies that money is better spent on the 'software' side of technology development i.e. the knowledge, skills and social organisation; and that the role of engineers and technicians lies less in perfecting the technology than acting as facilitators who can encourage farmers to make it useful in their own environment. ●

3

Water for life!

Conservation Tillage Project in Masvingo, Zimbabwe

The Conservation Tillage Project (ConTill) started in 1988 as a research project with two research stations, one near Harare and one near Masvingo, 300 km south of Harare. The project was based in the Institute of Agricultural Engineering which is part of the government's agricultural extension services AGRITEX and supported by the German Development Agency (GTZ). The initial project concept was developed by researchers of the department who wanted to expand on their work in soil erosion. Therefore, the goal was to test different conservation tillage techniques for their conservation and production merit. After testing on the research station, the successful techniques would be disseminated to smallholder farmers to slow down the alarming rates of soil erosion.

If we want research and extension to be successful, we must work with the people who are actually working on the land, irrespective of whether they are men or women.

The approach taken reflected the thinking of the department at that time, and was a classical 'technology transfer' project where researchers develop technologies, extensionists 'hand them down' to farmers, and farmers are expected to adopt the technologies irrespective of whether they meet their needs or reflect their own priorities.

Research was carried out on the stations for the first two years, then an on-farm trial programme was initiated with smallholder farmers as a result of a planning workshop which identified this as a better way of meeting programme objectives. As a result of this new way of working, the issue of farmer participation, and in particular the participation of women farmers, emerged as a priority. During the following years of working with farmers, the project went through a thorough learning process which caused a drastic change of the project towards farmer-led research and extension. In 1994, the learning of the project was synthesised into an approach for participatory innovation development and extension and this new approach was tested in seven different areas in Zimbabwe. This same approach is now being integrated into the national extension service.

Impact of the project

A baseline survey conducted in 1991 revealed that 62% of all households in the project area were headed by men; 24% by women whose husbands had migrated to towns for work; and 14% by unmarried women or widows. The last group constituted the poorest group in the community. Of all the farmers participating in agricultural extension, only 10% were women although both men and women conduct farming activities, with women specifically responsible for certain crops like groundnuts, vegetables and other subsistence foodstuffs.

The project was careful to find out who performed what agricultural tasks before making any interventions

The participation of women in farmer/community workshops increased from 10% to between 30-50% where farmer leaders had specifically invited women as well as men. Women's verbal contributions at these meetings went up to more than 50% in some instances.

Farmers began to initiate their own trials independently of the project. In one area, a total of 36 such trials on 16 farms were recorded at the end of the 1992-1993 season. In the following year, each of the farmers had at least three, and some had as many as 12 different trials being carried out on their own fields. Out of these experiments, a number of innovations emerged, like the use of implements, planting methods and relay cropping, amongst others. Women's experimentation on the farm increased within this general increase, with many of them becoming more active than their husbands, and showing more knowledge about a particular trial than other members of the family. The reliability and quality of research increased as a result. Although the general trend of women being 'testers of technology' rather than innovators remained, they did initiate small trials which had little risk and came up with good and valuable ideas. The researchers think that this trend of women being unwilling to take large risks in order to innovate comes about because of their important responsibility for food security for the family which cannot be put at risk just 'for an experiment'.

Together with farmers, the project developed simple, lightweight tools which can be used with donkeys as a result of this demand being articulated by women. Issues which were of particular interest to women, such as gardening activities, specific crops, food security, baking, soap-making, etc. gained more weight in the discussions and in experiments.

The understanding of processes and technologies which were developed has resulted in increased yields, greater diversification of crops, improved

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Improved methods of conserving water such as tied ridging is tested by farmers on their own land

soil and water conservation and an increase in non-agricultural income-generating activities.

The project's acknowledgement of non-formal, non-scientific knowledge highlighted women's role as farmers, and resulted in an increase in their confidence and willingness to expose that role and share it with other farmers. As a result, women who were rather shy and quiet gained considerable respect from other farmers, which in turn increased their participation in open meetings. Within the family unit too, there is evidence that husbands are more aware of their wives' contributions to farming and are actively supportive of their participation in meetings.

Women have been elected as chairpersons to some of the local institutions, and others have shown the confidence to negotiate more openly for their needs. Both men and women showed increased pride and confidence in their role as farmers because of the constant acknowledgement of their knowledge and skills within the project framework.

Strategies for engaging participation

The project wanted to engage the participation of all farmers equally. To do so, it had to learn what methods of encouraging participation of the most quiet and invisible community members would work in this context. As with all projects, there was no 'easy answer' and a number of different strategies were tried out, modified and adopted at different times in the project's life. Although women's participation was highlighted as an issue as early as 1991, the project hardly ever made gender issues or gender relations within the community an isolated, or specific topic. The project implementers believed that this would have created resistance on the part of some of the

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Negotiating for leadership qualities

The kraalhead is a highly respected traditional leader in any Zimbabwean community who carries other formal or political positions. During a review and re-planning workshop, farmers were asked to review their activities in groups according to their villages. During the report back to the plenary, there was one village group who said that they have nothing to present as there was nothing worth reviewing in their village. Other participants insisted that they share their reasons why nothing went on and why nobody could explain why. After a lot of probing of the participants, the wife of the kraalhead of this village stood up and stressed that the main problem would be the kraalhead (her husband), who does not give any feedback after going for 'look and learn' tours and workshops. All the other villagers agreed with her and were relieved. The kraalhead was quiet first of all, but later explained that he was not aware of the consequences and promised to improve on this leadership quality. Later, we heard from villagers that the kraalhead now shares ideas more openly and informs them more frequently.

Learning from behind

Mrs. Magura generally behaved like the farmer's wife. Although she participated in the workshops and always joined the researchers when discussing with her husband, she was very quiet and did not appear too interested to share ideas. One day, we took visitors to their farm and Mr. Magura, who normally explained their farm and their experiments, was not around. Mrs. Magura did not hesitate to explain all the experiments and answered all questions well and confidently. She even showed some of her own experiments which the project knew nothing about. The absence of her husband was her chance to prove that she is even more capable than her husband, not only to the visitors to the Maguras' farm but to Mrs. Magura herself.

extension workers through whom they were working, and some of the farmers as well. It proved much more efficient to put the general development goal, such as technology development and the spreading of knowledge, in the forefront and discuss gender as either creating a constraint or an opportunity within these goals.

This approach was taken in the light of knowledge that an affirmative action gender campaign had been running in the government extension service for some years, with zero positive impact on farmer participation. The department had also managed to create an aversion to gender issues amongst senior practitioners in the service.

Early on in the project, farmers were introduced to the concept of Training for Transformation, a training programme developed in Kenya in 1974 and modified for the Zimbabwe context in 1984. The training emphasises coming to a new way of thinking through participatory education where learning is based on each individual's own experience and reality. Based on slogans like 'Nobody knows everything; and nobody knows nothing', the training stresses the importance of participation of both men and women in organisational development in order to build institutions which help communities to become self reliant. The media used in the programme, for example pictures, songs, slogans and proverbs, encourage the participation of women and have been found to build their confidence.

The extension workers of both the government and non-government extension services were encouraged to play a role as facilitators, ensuring that all people's views and expectations were taken into account in any work programme. Gender issues were taken as only one part of the broader ambition of engaging farmer participation throughout. The success of this approach convinced AGRITEX to institutionalise it into their own working practices for agricultural extensionists. For this ambition to be achieved, a re-orientation of extension staff was required and this process is being facilitated through a training and learning process on the job over two years.

Often women found that they were unable to carry out activities agreed at workshops they had attended without their husband, because he had not given his personal agreement.

The project also recognised the synchronicity of its aims and ways of working with a similar project being carried out with another NGO, the Intermediate Technology Development Group (IT), which was working with farmers in the same district. The two projects joined forces by sharing methods, results, approaches of engaging farmer participation and so learned from each other and co-ordinated their lobbying efforts in favour of more participatory approaches in the national extension service.

In recognition of women's decision-making power within the household, the project tried always to include women in discussions, and not to be satisfied with always collecting together male heads of households and assuming they represent the whole community. For example, whenever discussions were held with the male head of household, project staff asked the women if they would like to join in the discussions, or directed questions to them specifically in order to involve them and give value to their opinions. Women proved themselves very willing and articulate when given this opportunity to speak in most cases, and men generally reacted positively to this move.

Specific invitations to both women and men to participate in extension meetings, community workshops, field days, 'look and learn' visits and evaluation tours, were always given to reinforce the principle of equal participation.

Finding early on that communication within families is weak, with information flows following the hierarchical structure (that is, the male head of household is not obliged to inform other members of his activities, whereas the wives and children must communicate comprehensively with him), the project tried to use all of their activities such as discussions, workshops, and evaluation tours as opportunities to facilitate better communication between family members.

In workshops, small groups were formed according to gender and age (that is, young women together, old women together, old men together, etc.). This proved an effective tool to create awareness amongst both the community and the facilitators of the difference in perception

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Women should be actively encouraged to experiment and make judgements about new equipment

and priorities which exist between the young and the old; men and women. When each group presented the results of their discussions in plenary, others within the community gained a greater understanding of these different views.

Proverbs, codes and songs which relate to gender were included indirectly in discussions wherever possible, in a way which didn't point to gender as the main topic but made the point about gender to all participants.

In all discussions about technology, great efforts were made to show the different impact upon men and women farmers in terms of resources, labour and skills. Tools to help pull out these differences include Participative Rural Appraisal (PRA) techniques of seasonal diagrams, matrix scoring, etc. Care was taken always to discuss gender as it related to technology, not as a subject on its own.

Information flows: where is the blockage?

On one occasion, a visit to the research station was requested by the farmers. Lack of sufficient transport only allowed us to take one person per household. We stressed that it would be preferable to strike a balance between the numbers of women and men. The visit went well, with about half of the households being represented by women, and half by the husbands. A week later, we assessed the information flow by asking the person (husband or wife) who did not take part in the visit, what the other person told him or her about the visit. To our surprise, it was only in those households where the women visited the research station, where the partners had been well informed. In the households where the husbands had visited, only two out of the 16 cases were the women well informed. In the other 14 cases, the women simply mentioned that their husbands had said that 'the visit was interesting' and did not explain any more details. It appeared as if it would be better to take the women only to the research station, as then the husbands would get the information, and both members of the household would be well informed.

Role plays, exercises and discussions which focused on women's specific tasks and abilities such as gardening, women's crops, etc. were used extensively to enable the women to be the most knowledgeable about this subject in a larger group. This tactic increases women's confidence to speak out, and encourages the men to hear and realise the depth of their wives' knowledge and competence. Also in relation to the media used in project work, there was recognition that extension is traditionally based on formal knowledge which is communicated orally and targeted at Master Farmers who have gained a certificate which requires a certain degree of literacy. Because of the system of culture and education, women tend to be less educated and are therefore alienated from the bulk of these extension efforts. The project tried to include women in these forum and to use other media to supplement the oral extension messages for women who could not participate, such as leaflets, posters, etc.

Women were used as chairpersons for discussions, as presenters of their on-farm experiments and in other positions where their talents and potential could be seen by all members of the community. In addition, workshops were often held at the weekends, when husbands working in urban centres have joined their families and can participate in discussions. Often women found that they were unable to carry out activities agreed at workshops they had attended without their husband, because he had not given his personal agreement.

The project recognised early on that farmers were not experimenting on their own because they did not believe they could do so. Strategies such as those described were implemented with a view to building up farmer self-confidence. Once the 'fear of new things' was dispelled, the farmers were equipped with basic knowledge of methods of small-scale experimentation and encouraged to

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Extensionists and project practitioners must take care to address both women and men equally

enter into an equal relationship with researchers which allowed them to be honest in their feedback of tested techniques. This relationship was dependent upon the researchers and extension agents adopting an attitude of respect and openness with the farmers.

Conclusions and recommendations

Action learning was the dominant vehicle in the development of the Conservation Tillage Project. Learning took place at the level of farmers learning through experimentation and the project itself learning through the cycle of action and reflection. The project concept and approach underwent drastic changes throughout its lifetime as a result, and produced a body of learning which can be summarised in two main points.

First, that while a situation analysis at the beginning of any project is important, the real issues and priorities of the people will only be revealed during a longer process of interaction. If taken seriously, gender will always reveal itself as one crucial issue in the learning process.

Second, that an 'action-learning' process is ideal for the identification of problems, needs and solutions together with the population. Mistakes are unavoidable - for this is the real world! - but it is important to admit them, learn the lessons from them, and move on. In technical and management terms, it is necessary to be flexible in order to take up lessons which are learned through the execution of the project, and to adapt the project concept and strategy accordingly. ●

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4

When a good design isn't enough

Maize cribs in Kenya

by Eva Tobisson

Background

The Rural Structures Programme (RSP) in Kenya, which was implemented by the Rural Structures Unit of the Ministry of Agriculture with funding from SIDA between 1982-1989, was established in 1979. Its two main objectives were to develop and disseminate functional low-cost rural structures both nationally and regionally, and to build up national expertise in extension and training with a focus on rural structures.

At that time, studies on post-harvest losses in different parts of Africa showed that losses during storage accounted for as much as one fifth of the total harvest by weight. The common practice was to pre-dry the maize crop in the field for a considerable length of time, and then to continue drying the maize on the cob (with or without husks) on the ground or on mats and subsequently in locally designed woven basket granaries. Suitable for traditional farming systems where land was plentiful and local varieties of maize were planted, the practice proved less suitable for densely planted hybrid maize which occupied the same piece of land year after year: pests built up and the new varieties were more prone to pests in the first place. The RSP developed a post-harvest management menu for maize (including a structure for drying and storage), which was interesting and functional from a scientific, technical point of view, but was not adopted outside of a privileged group of demonstration farmers.

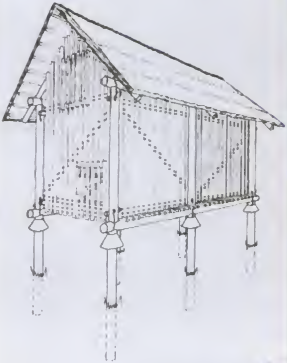
What happened

In order to meet the project's objectives of increasing food security by reducing post-harvest losses, a package was introduced made up of a crib structure for drying and storing crops, and instructions for post-harvest management. Training activities were carried out by the Rural Structures Unit to support the package. The selection of the crib and distinctive management practices was based on the implicit assumption that the package was superior to techniques and practices already existing in the local communities, and hence it would be readily accepted and adopted by farmers. It was assumed that the farmers in the neighbourhood would follow the good example of demonstration farmers, and that the entire family would be reached through approaching the male family head.

Some 200 maize cribs were erected and put in operation for demonstration purposes between 1982 and 1984. In the years that followed, an increasing number of demonstration structures were introduced until by 1988, more than 1,200 structures had been built in ten districts. But despite these impressive numbers, the crib was never widely accepted beyond the circle of demonstration farmers partly because of the rigid management package promoted by the project. During a series of project evaluations which took place between 1984-1988, it emerged that farmers were not adopting the crib for a range of cultural and social reasons. First, crop processing and storage are not activities carried out in isolation, but they form part of a comprehensive chain of agricultural operations which together make up the farming system. Second, farmers' knowledge, experience and perceptions influence their choice and preparedness to make investments (in terms of cash, labour and time). Third, the adoption of new techniques and practices depends on how and through whom the information is obtained. Cross-cutting all three factors is the importance of gender roles and responsibilities in the local community.

The improved ventilated maize crib

The maize crib is a rectangular raised structure, commonly made up of two sections, with a possible range of between 1-6, with slatted walls and floor and placed with the long wall facing the prevailing wind. The crib, in combination with early harvesting and optimal management, can reduce storage losses of maize from between 5-25%. It comes with a package of recommended management practices which include first, the early harvesting of maize once it is mature to reduce field damage due to bad weather, theft, insects and vermin; second, maize should be husked before storage to speed up drying and reduce insect infestation; third, cobs should be left to dry out in the crib for a maximum period of 60 days; fourth maize should be shelled and bagged immediately after it is dry; fifth, the inside walls of the crib should be covered with mats to keep out the rains; and finally the bags should be loaded into the crib



The ventilated maize crib has slatted walls and should be placed with the long wall facing the wind

Strategies employed by the project

The extension approach

The RSP approach to disseminating new technologies was to focus on demonstration farmers through the regular 'Training and Visit' extension system adhered to by the Ministry of Agriculture at the time. Such farmers would obtain structures for testing and demonstration purposes free of charge. Extension staff who had obtained specialised training, monitored the structures and management as part of their regular visits to the demonstration farms, and farmers in the neighbourhood were invited to obtain information and to ask questions. It is estimated that some 4,300 individuals obtained training up to 1989, the vast majority being extension staff and demonstration farmers.

The demonstration farmers were selected by district authorities working on the assumption prevalent at the time that progressive, well educated and relatively wealthy farmers would be successful in disseminating messages about technological innovations and improved land husbandry to so-called 'follow-farmers' in the neighbourhood. The majority of demonstration farmers encountered during a review in 1984 were teachers and headmasters, retired politicians, businessmen and relatively wealthy farmers. Few of the farmers exhibited characteristics of the intended beneficiaries of the RSP, i.e. holders of small and medium-size farms.

Information about the crib and associated management practices was poorly disseminated beyond the circle of demonstration farmers, who found it difficult to convince their neighbours to invest in the new technology. This was not surprising since the demonstration farmers were provided with building materials and craftsmen free of charge, whereas the more resource-poor follow farmers were expected to meet their own costs for building materials and construction work. Also, the message put across by the Ministry of Agriculture was that only one package of innovations was applicable, and hence the possibility to reduce the cost, or to make the crib and management practices more applicable to local practices and to local notions of design etc. was ruled out. The reason for this rigid approach was a concern not to confuse the extension staff and farmers with multiple options.

Farmers were concerned that their harvest would be visible to the prying eyes of others and vulnerable to the demands of poorer relatives and neighbours.

Extension efforts were aimed almost exclusively at male heads of households, and even though in Kenya it is the men rather than the women who make decisions about investments on the family farm, the women invariably carry the major responsibility for agricultural operations, including crop processing and storage. Women therefore are usually the ones who possess knowledge about crops and natural resource management, and it is they who judge the costs and benefits of innovations in terms of factors such as family labour input and quality of the output. This approach assumed that the project could convince the men to make a financial investment in the technology, and that the women would be interested and able to adhere to recommended practices. In reality, the men were reluctant to make the investment, and the women largely remained ignorant about the principles underlying improved storage structures, since they did not receive first-hand information from the extension staff.

Crop processing and storage

The project assumed that there was sufficient incentive for the farmers to change their traditional methods of maize storage. In fact, the price was set by government and there was no point keeping maize to sell some months after it was harvested. The two extra bags of maize which could be saved by using the crib was of no value to the richer farmers who could afford to build and maintain it: the poorer farmers, who might have welcomed such additional food security, could generally not afford to invest in a crib. In addition, the polygamous nature of most marriages in Kenya meant that families would rather have had a crib for each wife, rather than a single crib for the entire family.

The package brought with it potential negative implications, particularly for women: first, the recommendation that harvesting be done early threatened to interfere with other tasks that women had to perform, both agricultural and non-agricultural, at that time. Second, the directive that the entire maize crop be shelled at one time to prevent the spread of pests and mould involved up to 20 bags - an impossible task for one person to do manually. The project believed that men would automatically come to the women's assistance when larger quantities were to be shelled but this assumption was proved invalid.

The project failed to meet its objectives because of the lack of incorporation of local management systems and lack of a participatory approach.

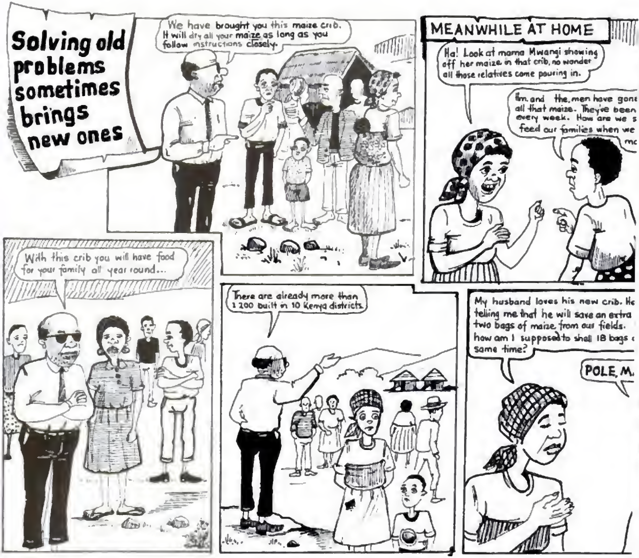
Local perceptions of design and operation

The crib design was conspicuously different from other farm structures in Kenya and this discouraged some farmers from adopting it.

Instead of the usual thatch for roofing, the design required expensive and conspicuous corrugated iron sheets. The shape of the crib, raised on poles, made it look unstable and feeble and vulnerable to being blown over: the fact that it was recommended to be located 'on the highest point in the homestead' confirmed farmers' fear that it would not stand. One female farmer drew a parallel between a pregnant women and a storage bin. "A basket granary stands firmly on the ground like a pregnant women, protecting what she carries inside from damage until it is ripe." From her perspective, the maize crib resembled a sick and weak woman, who would not be able to carry her child.

Farmers were concerned that their harvest would be visible to the prying eyes of others and vulnerable not only to theft from people and hungry cattle therefore, but also to the demands of poorer relatives and neighbours. "It is not that we refrain from helping each other," said one farmer, "but putting food on display could easily turn relatives who manage quite well into poor cousins." The only family not concerned by this increased visibility was one whose husband was given no choice but to sleep in the crib when he came home, drunk, to find closed doors in the rest of his homestead.

Farmers were keen to use the crib for storage of multiple crops, despite the instructions of the project to keep it exclusively for the storage of maize. Some attempts had been made by farmers to mimic the crib design using more affordable materials but none of these performed satisfactorily and most of them had been abandoned. Some farmers had tried to thatch the roofs, but the thatching turned out to be an


Solving old problems sometimes brings new ones
We have brought you this maize crib. It will dry all your maize as long as you follow instructions closely.
MEANWHILE AT HOME
Ha! Look at mama Mwangi showing off her maize in that crib, no wonder all those relatives come pouring in.
Hm. and the men have gone all that maize. They've been every week. How are we s feed our families when we mo
With this crib you will have food for your family all year round...
There are already more than 1 200 built in 10 Kenya districts.
My husband loves his new crib. He telling me that he will save an extra two bags of maize from our fields. how am I supposed to shell 18 bags same time?
POLE, M.

impossible challenge since the shape of the roof did not resemble anything they had experienced before. Some farmers had lost their entire crop because of mould caused by leaking thatched roofs. Another farmer had taken note of the narrow shape and constructed a crib-like structure which was even more narrow than the original design. While the farmers' fear that the project's maize crib design would blow over in strong winds was unfounded (no such cases were reported), this crib did!

Both men and women farmers feared that the large quantities of shelled maize available in the crib would promote 'uncontrolled consumption', and undermine traditional strategies to feed the family throughout the year for example by shelling enough maize to last only one week at a time. The women were also afraid that the men would be tempted to market large quantities when ample volumes of shelled maize were available. Both women and men brought up the issue of excessive beer brewing as a potential problem.

The women in particular also raised more concrete and substantial objections to the design of the crib. Since women in most cases were in charge of food storage, they complained that they had to ask for the assistance of male family members to load and unload the maize cobs which had to be done using the top door and a ladder. Apart from the weight that had to be loaded, the idea of rural women climbing ladders in Kenya is unthinkable! The women claimed that if the structure had been closer to the ground, they could have managed by themselves. They were also unhappy that the maize had to be shelled by beating the cobs in bags with sticks, because they claimed that this damaged the kernels and affected the quality of food and beer.

Although the rigid, single-package approach applied at the time, the project did engage in research and monitoring on alternative structures such as simple drying platforms and improvements on traditional storage bins, as well as management techniques which could be applied without necessarily adopting the entire menu. Yet, the results of the trials were for many years not brought to the attention of farmers as viable alternatives. Education and information materials produced later in the project presented the option of using less costly material, such as the use of twines instead of nails, cheaper pole materials and thatched roofs instead of iron sheets.

Conclusions

The RSP reflected the blue-print planning (i.e. centralised decision-making and pre-determined, quantitative targets as opposed to process planning) which dominated development thinking at the time of its conception and implementation. The project manifested many of the shortfalls of this approach, including a rigid engineering outlook; reliance on the Training and Visit extension system dominant in Kenya at the time; little or no attention paid to existing local knowledge and skills, gender roles and responsibilities; and few opportunities given to local men and women to participate actively in decision-making and control over project resources.

Towards the end of the programme period a few significant modifications in approach and package were made which together served to improve the communication between the Rural Structures Unit staff, extension officers and farmers. But the project failed to meet its objectives not least in part because of the lack of incorporation of local management systems and lack of a participatory (including a gender-sensitive) approach. Had such an approach been adopted throughout, the project might have resulted in a range of technology options on offer to the farming community, including the maize crib.

The case study does provide lessons learned for planners and practitioners involved in contemporary and future agricultural technology projects however. The principal conclusion to be drawn is that techniques and management guidance have to be dealt with as integrated parts of the social, cultural and economic environments within which they are put in operation. Such an approach requires that engineers work side by side with anthropologists and economists. Methods to promote participation in projects have become quite sophisticated since the introduction of Participative Rural Appraisal (PRA), and offer help to practitioners keen to engage community inputs into projects, including 'technical' projects.

Programme staff and extension officers dealing with natural resources management have been a specific target for PRA training initiatives, the aim of which has been not only to develop skills in using the techniques and collecting data, but to create and stimulate an awareness that local women and men can make an important contribution to planned development efforts, if only they are invited to take part in the analysis concerning important matters in their lives. It is important to keep in mind, however, that genuine participatory ambitions require more than launching isolated PRA exercises. What is needed is a process approach to participation, which may accommodate sequences of PRA, but where the overall ambition is to contribute to the empowerment of women and men and hence to increase their participation in decision-making and control over matters of importance in their lives. ●

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5

Space to listen, in order to learn

Shea butter production in Ghana

Background

The shea-nut tree *(Butyrosperum parkii)* grows wild in the savannah of western and central Africa in a belt about 5,000km long and 600km wide, stretching from Gambia to southern Sudan. Shea butter is widely used in Ghana as cooking oil, ointment and a cosmetic and it is exported for use as a substitute for cocoa butter and in the pharmaceutical and cosmetic industry.

In Africa, the butter is predominantly produced by women, using knowledge passed down from mother to daughter and through the extended family system. Knowledge is passed on by observation and practical experimentation. Each stage of the traditional process of production is done by hand. It is time consuming and laborious (see box) but trials show that this manual process produces as much butter from the raw material as modern industrial processes.

A number of development initiatives were carried out during the 1980s with the women of the Dagomba tribe in northern Ghana, who have a long history of shea butter production for local consumption and for sale. The objectives were to improve productivity by introducing machinery to replace some of the manual stages of processing. These interventions adopted different approaches, some more participative than others, and as a result met with varying degrees of success. The case study illustrates how successful technology development and innovation requires prior understanding of the processes and knowledge systems of the communities with whom the project is working. Without this cognisance and appreciation of what systems are currently in place, there are real dangers of project failure and further marginalisation of the communities concerned as a result of project intervention.

What happened

In the early 1980s, the National Council on Women and Development (NCWD) worked with the Dagomba women of Bunglung village near Tamale in northern Ghana to mechanise parts of

Traditional processsing of shea butter

First, the mature shea fruits are collected from where they fall from the trees by women and children between the end of May and August each year. During the peak season up to 45kg of fruit can be collected daily, which produces about 13kg of dry kernels. An average of ten working days is needed to harvest one maxi-bag of dry shea kernels.

Next, the fruits are boiled in water for up to three hours: The boiling dissolves the fleshy part of the fruit and exposes the nuts. It also succeeds in killing most of the micro-organisms and enzymes that can decrease the fat extraction rate. The nuts are spread out on mats and dried in the sun for between two and three days, depending on the hours of sunshine. They are then shelled manually by beating them on the ground with bent sticks, or on a flat stone with a pestle and mortar. The shells are then separated by winnowing and the kernels further dried in the sun on mats, or over a fire to prolong their shelf life. The dry kernels are packed into jute bags which can be safely stored for up to three years if kept in a dry storage structure.

Shea kernels vary in size from 1.5-7.5g in weight. Before roasting, they need to be crushed into granules not bigger than 7mm, and this is done by hand in a wooden mortar, usually by two or three women who pound simultaneously. Crushing can also be done individually, using a short wooden pestle and a flat stone. If a corn mill is available, it can be used to crush the kernels after the grinding plates have been separated and this takes one sixth of the time of manual crushing.

The roasting of the kernels is done in a big, round pot made from cast iron or aluminium which is placed over a heat source, usually firewood. The kernels are constantly stirred while over the fire, until they turn dark brown in colour. The final point is reached when a cracking sound is heard when water is sprinkled on to a sample of the crushed kernels. The roasted material is then spread on hard-packed ground and allowed to cool. It is then milled, or ground by hand by groups of women who work in sets of three together: the resulting paste is then divided into small amounts and ground to a smooth consistency between stones. The temperature of the paste is kept constant during grinding process by the addition of small amounts of hot water. This manual process takes between 40-60 woman hours, whereas grinding the same amount in a corn mill takes between 30-60 minutes machine time, and between one and two woman hours.

The freshly milled material is left to cool overnight to between 35 - 40°C. Lumps are crushed by hand and the women then stir the butter, slapping it with open hands to incorporate air into the mixture for between 30-60 minutes. It is ready when the surface of the butter appears grainy or uneven, and when a small ball of butter inserted into a calabash of water shows a white precipitate on its surface. When ready, water is added to the kneaded butter until a whitish cream rises to the surface and forms a thick, spongy, semi-solid layer. The clotted shea butter is lifted from this brown layer and washed in a separate bowl with water. The final cream contains between 50-60% shea butter and 40% air. This stage of the process takes about nine women hours.

The washed cream is heated in a big pot and the clear oil that is formed is ladled into a smaller pot, removing any scum that collects on top of the oil. After clarification, a black, oily residue remains in the pot and this can be used as a replacement for kerosene and for waterproofing mud houses. The clarified oil is poured into clean enamel basins and left to cool overnight. In the morning it begins to crystallise, perhaps after 'seeding' with a small lump of shea butter from a previous batch, and is stirred each hour with a wooden spoon until the oil has been transformed into a semi-solid state and has become shea butter. This is then transferred into a calabash, covered with a piece of cloth and removed for sale in the market. The stage of clarification, crystallisation and packing takes about nine women hours.

the traditional process. Their intention was to reduce the time taken by the women to produce shea butter, and thereby to increase their productivity. The women had already adapted a locally available corn mill to grind the roasted shea nut granules, leaving the crushing and removing of kernels and the kneading to be done by hand. The NCWD introduced the Mali oil extractor to the women, but it was rejected after a few trials because the machine produced 'runny' oil instead of the more pasty butter preferred by customers of the women, and the quality of the product was thus perceived to be poor.

Some years later, the NCWD teamed up with the International Labour Organisation (ILO), the government of the Netherlands and a local engineering company, Science Import Substitution (SIS) to try to develop equipment which might be closer to the women's needs than the imported machine. SIS, together with the GRATIS project (a national NGO which provides technical support and training to indigenous entrepreneurs) and the Technology Consultancy Centre (TCC) developed machines to mill, crack and crush the nuts, and to replace the manual kneading process. These were manufactured in the SIS workshops and tested in trials by the women over a period of months.

The women liked and accepted the machines for the milling, cracking and crushing of shea kernels, but they rejected the kneading machine. This was because the machine had the effect of stirring the mixture rather than kneading it, and this prolonged the creaming time. The traditional method of kneading involves dipping your hand into the paste and stirring vigorously. While stirring with the hand, women can tell what to do

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During traditional processing, women mix the paste by hand and can 'feel' when it is ready for the next stage of processing

next by the temperature and feel of the mass on their skin. When the paste is thick and difficult to stir, hot water needs to be added. When the paste is slippery, it means that the fat is melting, so cold water needs to be added. The addition of hot or cold water at particular times is an important component of the production process, which determines the quality of the final product and the efficiency of the extraction rate.

When kneading by hand, the women would recognise when the butter was 'ready' by looking for a change in colour of the kneaded mass from dark to pale brown. With the machine, these changes were not easily seen and the women had to resort to looking for traces of cream when cool water was sprinkled on to the paste. They were also unable to put their hands into the machine to constantly 'feel' whether the butter was ready, as they did when manually kneading, and because of this the women rejected the machine despite its speed of operation.

Two technologies with different attitudes

This story is told by one of the women who was involved with the series of interventions by external agencies: she tells it to illustrate how the attitude of an outsider can make all the difference in women's willingness to co-operate, and consequently the success of the project.

"First, the technologist from town X arrived to study our traditional methods of shea butter production and to explore the potential for achieving better efficiency rates. As we were going through the various stages, he would time the processes such as kneading, when to add water, and so on; look at his watch, tell us to stop, or to continue without listening to whether we thought it was the right time to do these things. The few times we tried to express our opinions, he would not hear them. So eventually we just gave up, and got on with what he instructed us to do just for his own satisfaction. We knew that the amount of oil extracted at the end was going to be low because he was making us do all sorts of wrong things.

After a few months, a second technologist came into the village. The way he worked with us was very different from the first one. At every stage of production, he would enquire why we were doing things the way we were, and really listen. Once we felt that he had an ear to lend us, we started listening to him as well. Eventually we got a much larger amount of oil from that trial. We learned that if we want to get our message across to the people who are involved in such work, it is simple: just tell them to listen!"

The next attempt to produce a kneading machine worked more closely with the women to understand better their needs of such a tool, and succeeded in making improvements to the original machine's baffle (the piece which determines the way in which the paste is mixed) in 1991, which made improvements in line with the women's needs. The resulting kneader gave an extraction rate slightly lower than the manual technique, but with savings of up to two-thirds on the time taken by this stage of processing. It was adopted by the women and continues to be used up to the present day, as do the other pieces of equipment introduced by the projects.

Strategies employed by the project

The original project intervention took an 'external' approach to the introduction of new technology. It studied the women and their traditional processes, extracting information from them about how they went about butter production and how long the various stages took them. The NCWD then identified a number of technologies which were suitable for mechanising these processes and found the most appropriate, according to their criteria, in neighbouring Mali. This was introduced into the community without formal attempts to find out what criteria the women might choose in the selection of a new technology.

The failure of this intervention taught the practitioners a lesson and subsequent interventions became more participative. The second approach employed a project team, made up of representatives from SIS, GRATIS and TCC, who visited the village on a number of occasions and worked with the women to find out about the traditional processes of production. A questionnaire was developed to identify how much the women knew about shea butter technology; how much of their knowledge was currently being shared; and the potential of this knowledge for further dissemination to other women.

The machines manufactured by SIS were tested in trials within the community over a period of time, and 12 women who had been involved in these trials were interviewed in depth, along with 12 women who had continued to produce shea butter using the traditional process of production. Experiments were conducted with both traditional and mechanised systems, and a researcher from amongst the project team used this excuse to find out more about the reasoning and practices behind the traditional processes. Previous documentation of the traditional production process was gathered and combined with results from the trials to complete the team's picture of patterns of knowledge and production. As a result of this process, the range of local equipment was developed, most of which was accepted.

For the development of the second kneading machine, the engineers lived and worked with the women to find out what were their requirements of such a machine. Extension workers from the local technology centre acted as communicators between the engineers and the women producers to ensure that information flows both ways were flowing smoothly and accurately. Their task was made easier because by this stage they knew much more about the process of traditional production, but it was important for them to create opportunities for the women themselves to 'invent' the machine so that it would not only meet their needs, but would have a greater chance of being accepted and used by them in the future.

It was during this stage of intense collaboration between practitioners and the women that the most useful information and skills-sharing took place. The engineers found out that the women 'took the temperature' of the mixture perfectly accurately during the process of kneading, simply by feeling it. Also, the women could assess whether the maximum fat had been extracted from kernels, and prove this assessment correct each time, without the use of laboratory weighing scales or any other technical equipment.

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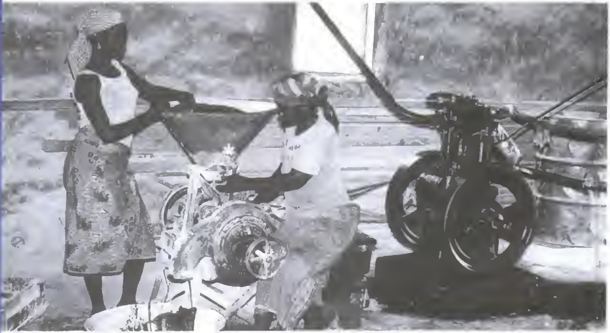
Shea butter is sold by the women in local markets and is in high demand

Conclusions

The series of project interventions with the women of the Dagomba tribe has helped practitioners understand more about women's involvement in technical change at the grassroots level, and has made women's knowledge and expertise more widely known. These investigations showed that women's knowledge of production processes, although scientifically based, is largely invisible as are their systems of transferring this knowledge to one another. Despite this, traditional knowledge and skills in production and technology play a crucial role in household survival and have been fine-tuned over generations to adapt to a complex interplay of social, economic and physical factors existing in the women's local environment. For example, the women rejected the first kneading machine even though it significantly reduced the time taken to complete this stage of processing because they knew the product would be perceived as inferior to manually kneaded butter, and would therefore not easily find a market.

The case study shows the importance of choosing a language of communication between practitioners and project beneficiaries which enables both sides to articulate their knowledge and skills and understand each others' messages without distortion. Even in situations where both parties speak the same vernacular language, there is plenty of scope for confusion and misunderstanding when technical jargon and complicated terms are used by one side or another. Users of technology are most often the ones with the most sophisticated understanding of how, why and when changes are necessary in the technology itself, or the ways in which it is used within a social setting. They also have a firm understanding of the market for this product: what is acceptable; what is preferred; new opportunities, etc.

External experts should employ strategies to ensure that their understanding of the local context is as comprehensive as possible before embarking on interventions which aim to make any sort of improvements. When working specifically with groups of women technologists, they should be aware and acknowledge the levels of skills and knowledge which already exist in that community before embarking on a process of dialogue and co-operation to understand what sort of innovations and improvements might be welcomed by them. ●



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The Dagomba women are still using the improved eqipment which took into account their needs and suggested design improvements

6

Small is beautiful

Biogas digesters in Tanzania

Generating energy to meet an average household's needs for cooking, heating, lighting and undertaking basic agricultural activities remains one of the biggest challenges in developing countries. Tapping renewable energies, such as the sun, wind, water and biomass, is a particularly attractive and sustainable solution in this part of the world, but one which has remained beyond the reach of most rural and resource-poor communities.

Biogas, the gas which is produced when animal, vegetable and human waste is left to ferment without oxygen or light, can be used for cooking, lighting, and refrigeration. But in Africa, biogas units have not been taken up as widely as the technology has potential. One of the main reasons for this is the high cost of many units, and the requirement for regular supplies of large volumes of waste products which is beyond the capacity of most households. Many cultures dislike the thought of utilising human waste, and using the gas produced from animal waste to cook their food. But biogas has many advantages, given suitable circumstances which make it an attractive alternative to conventional energy sources. As well as offering a partial solution to meeting a household's energy needs, a biogas plant can also provide a rich source of fertiliser from the digested sludge which gets taken up more readily than 'raw' manure because the nitrogen has already been partly 'burned off' and is more easily absorbed by the plant. This advantage has to be offset against the disadvantage of the slurry produced by the biogas plant being less easily transported to farmers' fields. For this reason,

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Cooking with biogas is clean, cheap and easy to control

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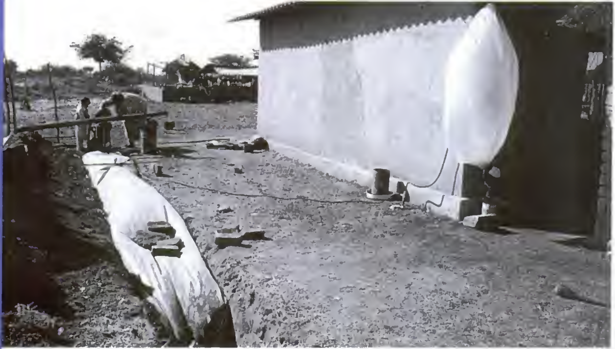

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The digester is made from tubular plastic sheeting laid into a 10 x 0.5 m trench and the gas collected in a reservoir fixed next to the house

more attention has been given to finding alternative designs of plant which are more suitable and affordable to Africa's farmers.

Background to the project

As part of this effort to make the technology more affordable, and increase its uptake, a low-cost tubular plastic bio-digester was developed in Colombia in the early 1980s, based on a design first promoted in Taiwan called the 'Red Mud PVC'. The unit, which takes about one day to install, costs no more than $100 and can produce gas with the waste produced by two cows. Conventional biogas plants, which consist of an airtight pit or container (known as the digester); an inlet and outlet pipe and a gas holder to collect the gas usually costs more than US$1,000 to install and the plant requires waste from about five or six cows per unit.

The technology was disseminated and taken up in Viet Nam and Colombia, and introduced into Tanzania in March 1993 by a Technical Co-operation Project of the Food and Agriculture Organization of the United Nations (FAO). The first unit was installed in a piggery in the Highlands of Tanzania, which produced gas three weeks after installation. A workshop was held the following year to share information about the new design, and it provoked much interest from both government and non-government agencies.

A local non-governmental organisation, SURUDE (which means 'Foundation for Sustainable Rural Development'), was formed and took responsibility for the dissemination of this technology. The specific requirements for the biogas plants were to reduce time women spent collecting firewood; reduce deforestation by cutting down on firewood consumption; and introducing cost savings by reducing expenditure on charcoal and other energy sources. The project recognises that duties within the household are split between men and women, with women taking particular responsibility for feeding the digester with manure and water, and men maintaining the burner in the house itself.

The plants were introduced into three different areas: Turiani village in the north of the Morogoro region; Amani village in the Usambara mountains of Tanga region; and Nronga village in the Kilimanjaro region.

Impact of the project

To date, more than 200 units have been installed in three districts of Tanzania. According to SURUDE, they have brought advantages of convenience, cost and fuelwood savings of up to 60% at a household level. However, uptake has not been without its share of problems. For example, there were differences between districts because each has unique socio-economic profiles and ecological factors which determine people's perception of the value of the technology. For example, there is plenty of firewood in Amani village because it is located inside a National Conservation Area. Although people are prevented by law from cutting down trees, there are plenty of trees and the people do cut them down to meet fuelwood needs. The cost savings of the biogas unit is therefore not a consideration in this area. The project's dissemination strategy attempts to take into account these different technical, social and economic factors and respond to them appropriately.

In 1995, a survey of 26 households in the three districts with the technology installed described the response of women in a generally positive light, even though many of the women admitted that they did not rely on the technology to meet all of their energy needs for cooking. They said that cooking was easier, cleaner and healthier with a biogas unit, as the gas burns without any smoke. They also appreciated the convenience of getting up in the morning and being able to make tea immediately, as well as whenever someone visited their house without warning. They confirmed that it was easy to cook with the gas produced by the technology; and that it saved money because less charcoal and kerosene had to be purchased. In Nronga village, which is badly deforested and the people have to buy their wood rather than collect it, women said that the technology saved them money although the high altitude of many households meant that many of the units didn't produce sufficient gas for cooking because of the

How the plant works

The transparent, polythene, tubular plastic sheet is laid inside a trench dug just over half a metre deep and 10m long: this is the digester. An inlet and outlet pipe are connected to the digester and a safety valve, made out of an old plastic bottle partly filled with water, catches any condensation which might build up in the system. The gas reservoir can be made from the same material as the digester, and fixed either vertically or horizontally into the gas line, in a shaded place near to the house. A weight, such as half a brick, should be connected to the bottom to increase the pressure of gas coming out of the system. The pipe leading into the house can be connected to any design of cooking stove. To ensure a regular supply of meaningful quantities of gas, the digester should be fed with one bucket of animal dung and three buckets of water every day. The digester itself should be protected from direct sunlight with banana leaves, iron sheets or canvas materials and from animals by erecting a fence or hedge around the trench. The plant will produce maximum gas when kept at temperatures between 35-40°C but will stop producing gas if temperatures fall below 10°C or if the plant is not fed with water every day. If temperatures fall below 20°C, the plant will produce insufficient gas to create the necessary pressures needed for cooking food.

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The biogas digester should be fed with animal or human waste and water every day

frequency of cold nights and early mornings.

In all three districts, women interviewed said that the gas was particularly useful in the wet months when drying wood is time-consuming. They agreed that having a unit reduces the time they would usually spend on tasks in preparation for and actually cooking: in two of the three districts the women had previously had to walk up to half an hour to fetch fuel. In Amani, the owners of the plant also said that the slurry provided them with better fertiliser than they had previously, and it contributed to their forest conservation efforts. One advertised advantage of the biogas plants - that they generate energy from manure but do not use up the manure itself so it can still be used for fertiliser on farmers' fields - has not realised its potential in two of the three districts. This is because the slurry which results from the manure and water mixture after fermenting, is liquid and difficult to carry.

However, many households complained that the plants produced insufficient gas, and that gas pressures were very low and inadequate for their cooking needs. In one case, the pipe which had been installed was too short to reach the kitchen and the women were unable to use the burner at all for cooking.

A number of the plants were not working, and hadn't been for some time because of problems such as broken gas handles or cracked burners. The families, although trained in basic maintenance, were waiting for the technician from SURUDE to fix the equipment. But because he was responsible for covering all three districts, the delay often stretched to many weeks before he could reach individual households. Very few households had paid for the technology and because the ambition of the digesters was to save labour as well as money, many of them were not generating earnings with which to pay back the costs at all. This has implications for the sustainability of the technology.

As part of the plant's installation, a burner was provided by the project, but it was too small for the size of the pots which women traditionally cooked with, and few households used these burners. Instead, farmers have been encouraged to innovate with their own types of stove in the kitchen. Different clay stove designs have emerged, and one welder modified a traditional stand to disperse the gas and thereby produce a wider circle of gas on which to cook. Another farmer innovation which was discovered during a follow-up visit was the burial of the gas reservoir in a hole dug outside the house. This was to protect it from the heat and external disturbance by animals. The project hopes that by sharing these spontaneous innovations with other farmers, they will be encouraged to do their own experimentation with the design.

Strategies employed by the project

The project is not proactive in its dissemination of the biogas technology. It responds to requests for information about the plants, and to specific requests to install units in individual households. Prospective users are reached by setting up demonstration projects in the three districts. The highest number, 150 plants, has been installed in Turiani, Morogoro district where SURUDE has its headquarters and where an extension officer has been employed to carry out technical troubleshooting and longer-term support.

But, like most of Tanzania, there are very few boreholes or tap water supplies in this area, and women found it hard to collect enough water to fill up the digester when it was first installed, and then to meet the daily requirement for two buckets afterwards. This has made the technology unpopular and may have affected subsequent dissemination efforts. As a result, the project now tries to ensure that nearby water is available when choosing where to install new units.

The project provides one day of training to both husband and wife and installs the plant with their joint participation to ensure that both individuals are equipped to maintain the plant on a day-to-day basis. SURUDE has found that despite this initial training, farmers are unwilling to undertake even basic maintenance themselves, and the organisation believes this is because farmers think that the technology is 'beyond' their knowledge and expertise; another reason could be that the farmers are not trained sufficiently to undertake such maintenance or that they do not consider the technology necessary to their daily lives and therefore do not prioritise its repair.

To try to combat this, the project provided extensive training to an enthusiastic farmer in Amani to

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A weight, connected to the bottom of the gas reservoir, increases the pressure of the gas supply enable him to provide 'on-the-spot' support to households in nearby villages, and thereby show that the technology could be mastered by ordinary farmers. Unfortunately, the other farmers have proved unwilling to pay this farmer for his services because he is not considered an 'expert' even though he fixes their plants when they need repair. The project is considering other strategies to overcome this seemingly circular problem, including paying for the repairs undertaken by the farmer in the short term.

The plant's waste product, slurry, is useful as a manure but its liquid form presents a number of practical problems to the women whose responsibility it is to fertilise the fields in this part of Tanzania. According to SURUDE, the women complain that it is difficult to use the traditional methods of working out how much dry manure should be distributed on their fields. They also report that the farmers think they have been 'cheated' because the slurry is less in volume than the equivalent dry manure and do not like the inconvenience and practical difficulties of carrying the liquid over long distances. This means that the distribution of manure between the farmers' different plots has changed and it is not known what impact this has had on crop yields. This problem doesn't arise so much in Amani, which is very hilly and where the farmers have dug furrows to transport the liquid slurry to their fields. It also doesn't arise in particularly fertile districts where the farmers do not need fertiliser, and where they simply dig a pit and deposit the slurry into it as waste.

In Nronga district however, where soil fertility is very low and fertiliser is necessary for crop production, the women traditionally dig pits in which they put leaves and other dry litter which is

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The technology can be maintained by both men and women, and produces gas at temperatures above 10°C

then used as bedding material. Because the biogas digesters do not perform well when the manure is mixed with this sort of material, the women did not accept it easily as it interfered with their normal patterns of farming. They told the project, which responded by draining the manure and this partly solved the problem.

Although the project admits that discussions are usually held with the man of the household if there is only one person present, or to the man even if both men and women are present at the discussions, they are confident that the men speak on behalf of both individuals. However, as a way of encouraging the women to speak up about problems they might be anticipating or already experiencing with the biogas units, the project used women as resource persons to train other farmers in Uganda (as part of their regional dissemination efforts) in early 1996. The results of this strategy are to be fed back to students from the university who have been trained to take over technical support and follow-up on behalf of SURUDE. The project hopes that this intervention will not only show that women are capable of controlling the technology, but show the students - most of whom are male technicians - that women are capable and have potential to make decisions about technology choice and use.

Conclusions

One of the obvious limitations of describing a project which has not yet carried out all of the activities designed to meet its objectives is that the results are incomplete and definitive conclusions are difficult to draw. The biogas project, like many others, has also suffered from the lack of a comprehensive monitoring and evaluation system since its conception and therefore it is difficult to assess how well the technology has brought about its intended impact amongst women and men farmers in Tanzania.

The information that is available about the project shows that the south-south dissemination of appropriate technologies, while very desirable in theory, has to deal carefully with the practicalities of transference across cultures. For example, the plastic biogas digesters which have found such success in households throughout Viet Nam, meet the needs of women whose cooking habits differ significantly from the women in Tanzania. In Viet Nam, the staple food is rice which takes less time and energy to cook than the staple cassava in Tanzania which needs cooking for a long time before it can be eaten. Many of the women in Tanzania report that the gas pressures are too low, or the supply itself is too limited to meet adequately all of their energy needs for cooking. However, with persistent monitoring and acknowledgement of the practical problems of such a potentially appropriate technology, the project has hopes that it will succeed in meeting most of their objectives. ●

7

Introducing animal traction

The Mbeya Oxenisation Project in Tanzania

Animal traction technology has the potential to relieve the drudgery of millions of resource-poor farmers working in east and southern Africa; it has the potential to lessen their burden and shorten their working hours and yet despite the hundreds of development projects that aim to improve the quality of life of the poorest community members, animal traction technologies have failed to reach the majority of them with tangible benefits. Why is this so?

Part of the reason is because development practitioners responsible for implementing such projects are overlooking at least half of the community. Their oversight is mostly unintentional but no less damaging because of it. Often, the practitioners pass over the poorest community members because of prejudice, insensitivity and ignorance of the appropriate tools which could help them to 'see' the invisible farmers. The perception is that some farmers are too weak and afraid to handle oxen; that they will destroy the equipment because they don't understand it; that they have no interest in learning about the technologies and that there is no meaningful role for them to play in animal traction projects. More often than not, these 'poor and invisible', 'weak and afraid' farmers who 'have no interest in learning about technologies' are women.

The Mbeya Oxenisation Project (MOP) began in the southern highlands of Tanzania in 1987 with the ambition of promoting agricultural development through the production, marketing and extension of animal traction technologies appropriate to smallholder farming systems. Although the project intended to reach both men and women farmers, there was initially no strategy to ensure equal 'reach' into these different groups of people, with the result that women were overlooked at the start and the project had to incorporate strategies to overcome this bias as it went along.

In the first phase (1987-1993), the specific intention was to increase use of animal-drawn equipment such as weeders and carts by those farmers already using animal traction for ploughing. The project was a joint venture between the government of Tanzania, the Canadian International Development Agency (CIDA) and the Mennonite Economic Development Association (MEDA).

Background

The Mbeya region of Tanzania is relatively fertile, with significant variation in soil type and rainfall (between 600-3,600mm) across the six million hectares which make up the region. Mbeya's 1.1 million inhabitants contribute significantly to the national production of maize, the major food crop, and often export to other parts of Tanzania and occasionally, outside the country. Inadequate weeding is considered the main factor limiting maize yields, but at the beginning of the project only 15% of smallholder farmers owned cattle and the majority of them did not use draft animals for weeding. This figure hides great variation, however, including no farmers owning cattle in areas which produce no cash crops and as many as two-thirds of all farmers in cash-crop producing areas, owning cattle.

Farmers in Mbeya district were forced to travel for up to two days from the rural areas where they lived to purchase equipment or spare parts.

Overcoming problems of access

A baseline survey was carried out among 511 smallholder farmers in areas of Mbeya which displayed the highest utilisation of animal traction. This highly structured survey guided the implementation of the project. A literature survey was carried out at the same, early stage of the project and interviews were conducted with farmers to establish the main constraints which they faced in adopting animal traction for weeding. These were, starting with the most important, non-availability of implements; poor implement quality; inadequate repair services at village level; previous emphasis on inter-row rather than over-the row cultivators; poor extension; lack of communication between manufacturers and farmers; poor timeliness of operations; inadequate training of animals; and fear of crop damage by animals and implements.

The project explored further the main problem of non-availability of implements, and learned that the main manufacturer, importer and supplier of animal-drawn implements, the Tanzanian parastatal Ubungo Farm Implements (UFI), was based in the capital Dar-es-Salaam some 800km from Mbeya region. Although UFI supplied goods to intermediaries in urban centres, there was no way of reaching farmers at the village level. In Mbeya district, the implements sometimes reached the towns of Mbeya, Kyela and Mbozi but farmers were still forced to travel for up to two days from the rural areas where they lived to purchase the equipment or spare parts. As part of the government's commitment to policy of developing animal traction technology and making it available to farmers in villages, a second parastatal agricultural implement factory was set up in Mbeya called 'Zana Za Kilimo', but this company, like many others, was not interested in making or reaching smallholder farmers with agricultural implements.

Surprising truths

It is easy to get the wrong impression about animal traction. People often believe that farmers who use animal-drawn equipment work far fewer hours than those who do the same work by hand. But in Mbeya, this was not true. A survey conducted in 40 households over one growing season, half of which owned oxen and half which didn't, showed that members of the oxen-owning families spent up to three times as long in the fields as their neighbours. Males spent 25% longer in the fields than their counterparts: females spent more than half as much time as theirs and the children in oxen-owning households spent up to 338% more time working than other children.

The project believes these surprising facts occur not because the technology is less efficient, but because households owning animals cultivate nearly twice as much land for the three main crops as those without animals.

The project also found that the equipment is not used equally on all crops, but it is more likely to be used on cash crops with a high value and high status, than on food crops which have low cash returns and low status. For example, for each unit of coffee planted in Mbeya, households without oxen spent twice as much time working them compared to their neighbours who owned oxen. And yet for each unit planted under beans this pattern was reversed, with households owning oxen actually spending 16% more time working on them than their neighbours who were doing the same work by hand. The project was concerned that this allocation of draft animal technologies was made because coffee is a 'man's' crop and beans are a 'woman's' crop. The implication is that women, instead of being helped by the technology, are in reality being further disadvantaged by it.

The project decided to intervene to make implements more available at the village level in Mbeya. It developed three specific marketing objectives: first to distribute relevant and appropriate animal-drawn implements to farmers in the region; second, in co-operation with MOP Engineering, to promote the use of village workshops where farmers could obtain spare parts, have repairs done, or purchase complete animal draft implements; and third, to establish a reliable and permanent distribution system for animal-drawn implements.

It did so in two ways; first by directly selling implements to farmers in the villages themselves as a short-term strategy, aimed at making the farmers aware of the project, and second, by selling to farmers through village-based sales agents. By 1993, the project had 16 agents in different villages in the district, most of them employees of co-operative societies, trading companies, agricultural officers or private businessmen. Implements sent by the project to the agents are charged to the agents' credit accounts which have a ceiling. Agents receive a 10% commission against sales every quarter and are invited to seminars organised by the project to strengthen their skills in marketing and book-keeping. The project's Extension and Marketing sections are training farmers in the use of other implements in an attempt to help stimulate extra demand for animal drawn tools. The agents considered their role not so much as part of a development project, but as a business, and the project hoped that this would provide the key to the sustainability of the supply of implements after the project had ended.

Reaching the women

The project had no explicit strategy with which it hoped to recognise and incorporate gender needs into the project and thereby achieve full farmer participation. After the first year it was realised that the majority of farmers - the women - were not becoming involved. To try to bring about some change in this undesirable trend, a 'Gender Issues Section' was created within the project. Its specific objective was to listen to, and work with the women farmers and to develop and integrate into each level of the project a positive response to the needs, opportunities and constraints of these farmers.

As a first step, it explored the gender relations between men and women in the community as a way of making sure that women became equal participants in the development process: by gender relations they meant what women do, or do not do, because this is related to what men in the same community do, or do not do. This is one of the basic analytical tools of the 'gender and development' approach.

The section quickly realised that animal draft technology was predominantly considered to be a male dominated activity: not only within their own project but in others as reflected in the literature. For example, most posters promoting this technology feature men, not women, with the animals and equipment. Part of this perception included the stereotyped idea that women were too weak and afraid to handle oxen, and that they would destroy the equipment because they were not capable of understanding it. Decision-makers, from regional government to village level, were not aware or willing to acknowledge that the women of Mbeya had a role to play in animal traction.

The second problem area was the misunderstanding among practitioners that tackling gender issues would lead inevitably to a disregard of cultural tradition and procedures and a breakdown in cultural systems as women took control from the men. The fear of this anticipated change brought about raised barriers to effective communication between the practitioners and those people they were working with.

As a result of frequent interaction with farmers, the project staff developed a relationship with the women which gave them insight into their views on animal traction. The women revealed that, far from being disinterested in the technology, they were interested but felt powerless to try working with oxen because men were the exclusive owners of the animals and exercised complete control over them.

The project tried to tackle these problems in three major ways. First, an awareness campaign was carried out at household level to raise awareness of who benefits, and who could benefit, from animal traction technologies. Discussions were held with contact farmers to explore what members of the household were responsible for what cropping and other activities. It was emphasised, for example, that ox carts could be used to carry water for domestic use (a woman's responsibility), as well as for brick-making (a man's responsibility). Illustration was also made of the use of an ox-drawn ridger for ridging a woman's bean field as well as for ridging a man's maize field. Through such strategies, a new

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Introducing animal-drawn equipment to increase efficiencies of agricultural activities such as weeding doesn't necessarily cut down the number of hours farmers work in their fields

perspective gradually developed within the households, with men becoming more aware of the value of animal traction technologies for the benefit of the whole family. Women gained skills and confidence, not to mention relief from some of their responsibilities.

Second, the project organised women into groups and provided them with loans to buy oxen and equipment, and to establish income-generating projects based on animal traction. By doing so, they overcame both men and women's perceived barriers to women using oxen. Organised in such groups, the women found the confidence to counter family, community and cultural constraints to working with oxen: as individuals they may never have had the courage to plough a field with oxen but with the support of other women, they were enthusiastic users of animal traction. The project provided specific training on animal traction and project management, as well as more general awareness raising of the potential role of women in development.

The third strategy was for the project to conduct a 'gender sensitisation' campaign with all project staff, to ensure that each member understood and agreed the reasons why the project was trying to involve women. In this way, it was hoped that a consistent message would be communicated by all project implementers to the farmers with whom they were working. Using basic organisational tools, all project staff were led through a process of recognising their fears or ideas surrounding women's issues: they discussed what gender issues are for development workers and what implications they have specifically for animal traction projects. Participation from project staff was active and honest, with staff raising such questions as "I am afraid about what will happen if women are equal." At all times the project tried to explore such fears through discussions of development issues rather than equality issues. Staff urged the project to continue the process of awareness raising throughout the project's life rather than just as a short-term campaign.

Conclusion

The project achieved a number of its original objectives by changing and enhancing its original strategies as it came across problems in order to deal with them. First, by recognising early on that the issue of gender was not being adequately tackled and embarking on a number of activities specifically to rectify this difficulty, the project succeeded in bringing about a greater consciousness of the realities of incorporating gender needs amongst both the women farmers, and the project practitioners themselves.

Second, by adopting a commercial approach to the distribution of animal traction equipment, the project overcame one of the major constraints to greater uptake of this technology. By doing so, it hopes not only to have impact in Mbeya, but to provide a model that could be copied by the official marketing institutions which dominate in Tanzania. This could happen in different ways. Pressure exerted by employees, who are agents for the project, on their organisations could influence them to adopt similar techniques for reaching smallholder farmers. Pressure by the farmers themselves on their local village co-operative societies or private shops could bring about greater local supplies of agricultural implements: many co-operative movements have village depots which currently sell some agricultural inputs such as fertilisers, seeds and insecticides but not animal-drawn implements. The project recognises that without government adoption of this system of reaching smallholder farmers, the interventions of the project will have only limited, local impact. ●

8

Further reading

A resource guide

The Gender Booklet was intended to convince practitioners of the importance of integrating gender considerations in agricultural engineering, and to demonstrate through case studies some of the ways to do so. If the agricultural engineers who have read this booklet would like to follow the examples of their colleagues described in the case studies, there are many places they can turn for help. Some tools for the integration of gender have been described in practical, ready-to-use ways in the following publications:

- Appleton H, Fernando P and Wijethilake S (expected 1999) **Discovering technologists.** Intermediate Technology Publications, 103-105 Southampton Row, London WC1B 4HH, UK (email itpubs@gn.apc.org).
  The training package is a tool designed to increase the skills of field workers working with grassroots communities who are involved in the processes of technology development. It aims to improve the capability of men and women field workers to recognise and work with women's existing technical skills. Currently being piloted, the publication describes a modular training programme, which in total lasts five days and assumes a degree of gender awareness among participants. The objective is to raise their awareness of the different technical skills and capacities of men and women, and to link this to practical strategies for improving approaches to project interventions.
- Burkey S (1993) **People first: A guide to self-reliant, participatory rural development.** Zed Books, London, UK.
  This book links theory and method. The first section analyses poverty, introduces theories of development, and examines what 'participatory development' means. The second part takes up field methodology and problems. It addresses the training of change agents and the practicalities of change inputs. A final short section reflects on the objectives and principles of popular participation. Women's participation in particular is emphasised throughout the book.
- Chambers R (1992) **Rural appraisal: rapid, relaxed and participatory** (IDS Discussion Paper 311) IDS Publications, Sussex University, UK.
  Robert Chambers begins this discussion paper with a review of some academic and research sources of Participative Rural Appraisal (PRA) and its development from Rapid Rural Appraisal (RRA) methods. This is followed by a definition of PRA, its principles and a 'menu' of PRA/RRA methods. He then discusses PRA methodology in depth including prerequisites such as a relaxed atmosphere and a level of

participation which allows local empowerment in the process. A large part of the paper is taken up with discussion as to why PRA, if properly conducted, is more successful than top-down methods.

● FAO (1997) **The SEAGA Package.** Women in Development Service (SDWW), Food and Agriculture Organization, Viale delle Terme di Caracalla, 00100 Rome, Italy.
(email : SEAGA@fao.org)
Since 1993, the Women in Development Service in FAO (SDWW) has been developing the Socioeconomic and Gender Analysis Programme (known as SEAGA) in collaboration with other multi lateral and bi lateral international development agencies and research institutions. The SEAGA Programme, which promotes people-centred development programming, draws from numerous development models and includes a conceptual framework for socioeconomic and gender analysis, and methodologies, materials and tools for producing and utilising more comprehensive socioeconomic and gender-based information. The SEAGA Package includes The Framework and Users' Reference, Handbooks for the Macro, Intermediate and Field levels, Training of Trainers materials, Electronic materials, sector and issue-specific technical guides.

● Feldstein H S and Jiggins J (eds) (1994) **Tools for the field.** A methodologies handbook for gender analysis in agriculture. Kumarian Press.
This handbook offers a practical set of tools for the novice or experienced professional working on gender analysis in agriculture. It provides real-life examples on how to assemble and use all the research tools needed for the collection of gender-sensitive data in a timely and cost-effective way. The book includes 39 case studies drawn from Latin America, Asia and Africa, which together illustrate techniques ranging from gender-sensitive interview guides to incorporating a gender dimension into standard PRA methods.

● Feldstein H S and Poats S V (eds) **Working together: gender analysis in agriculture.** Volume I: Case Studies. Westview Press, Boulder, USA.
The conceptual framework presented in this book provides guidelines for gathering, analysing and applying information on gender roles and intra- and inter-household aspects of farming systems for the design of improved technologies for agricultural and livestock systems. Its aim is to revise the bias of gender which underlies much current agricultural research and extension efforts.

● Flach M (1996) **Gender and post-harvest technologies: the use of farming systems development and participatory approaches.** FAO, Viale delle Terme di Caracalla, 00100, Rome. Paper presented at the Workshop on Gender and Agricultural Engineering 1996, Kadoma, Zimbabwe.
The aim of this paper is to provide tools for better understanding the environment in which small farmers operate through the Farming Systems Development (FSD) approach. The paper gives some background information on FSD, describes methodologies commonly used within it such as Participatory Rural Appraisal, and looks at the involvement of men and women throughout project design and implementation.

● Gianotten V, Groverman V and van Walsum en Lida Zuidberg V (1994) **Assessing the gender impact of development projects: case studies from Bolivia, Burkina Faso and India.** KIT Publications, Intermediate Technology Publications, 103-105 Southampton Row, London WC1B 4HH, UK.
Related to the publication 'Gender Assessment Study: a guide for policy staff', this book presents three case studies which were intended to test the validity and use of the methodological framework of GAS, and to gather data that would allow the elaboration of the general guidelines of the GAS. The studies show the importance of an in-depth analysis of gender relations during the planning phase as a means of achieving project design and implementation that give due consideration to the needs and interests of men and women. The original methodological framework of the GAS and the experience gained in using it are also discussed. The book is intended for a wider readership than the Gender Assessment Study.

- Lingen A (1994) **Gender Assessment Study: a guide for policy staff.** Special Programme for Women and Development, Directorate General for International Co-operation, the Netherlands. *The Gender Assessment Study (GAS) is an instrument that can be used in the formulation-appraisal phase of development projects to gain insight into the way in which a project should be designed to have a positive impact on women. The guide is of interest to policy makers and development workers who are seeking to incorporate gender concerns in the planning of development projects. The guide explains what GAS is; why and when it can be useful; and which methodology can be followed from a range which includes mapping, interviews and transect walks.*

- Moser C O N (1993) **Gender planning and development: theory, practice and training.** Routledge, London, UK. *Gender planning is a new tradition whose goal is to ensure that women, through empowering themselves, achieve equality and equity with men in developing countries. This book discusses the three interrelated stages of gender policy, gender planning and the organisation of implementation. It describes the conceptual rational for a new planning tradition based on gender roles and needs, and identifies methodological procedures, tools and techniques to integrate gender into planning processes. The book emphasises the role training plays in creating gender awareness, and highlights the entry points for women's organisations to negotiate for women's needs.*

- Munro M (1990) **An end in itself: gender-aware project appraisal and planning.** AERDD Bulletin. Vol 12, no 4. Institute of Development Studies, Sussex University, UK. *The bulletin examines and discusses methods of Rapid Rural Appraisal (RRA) which are of particular importance in incorporating issues affecting women into project design. It starts with the perceptions of the investigator (the 'ideology'); explores the nature of information collection (the epistemological issues); outlines aspects of methodology ('on the road') and finishes with the interpretation of information ('the hermeneutics').*

- Oakley P et al (1991) **Projects with people: The practice of participation in rural development.** ILO, Geneva, Switzerland. *As the subtitle makes clear, this work is about the practice, rather than theoretical aspects, of participation. The book spans a variety of sectoral approaches to participation including agriculture, forestry, environment, water and health. A number of case studies from Africa, Asia and Latin America are utilised to illustrate successes and failures of approaches to participatory development. The second half of the book examines the practice of participation as strategy, methodologies and evaluation.*

- Rani Parker A. (1993) **Another point of view: a manual on gender analysis training for grassroots workers.** UNIFEM, New York, USA. *The Gender Analysis Matrix (GAM), a method for designing and implementing gender-sensitive programmes is introduced in this manual. Particularly interesting for workers at grassroots level who often have to work under constraints imposed by shortage of funding and time, illiteracy, and insufficient or non-existent quantitative data on gender roles, GAM provides a community-based technique for the identification and analysis of gender differences in order to assess the different impact of development interventions on both men and women. GAM also initiates a process of analysis that identifies and challenges in a constructive manner assumptions about gender roles within the community.*

- Thomas-Slayter B, Esser A L and Shields M D (1993) **Tools of gender analysis: a guide to field methods for bringing gender into sustainable resource management.** ECOGEN Research project, Clark University. *This guide focuses on ways to use gender analysis to increase the effectiveness of development programmes and projects for sustainable resource management. It briefly lists different tools for gender analysis.*

- Van Veldhuizen L, Waters-Bayer A and de Zeeuw H (1997) **Developing technology with farmers: a trainer's guide for participatory learning.** ETC Netherlands, ZED Books, 7 Cynthia St, London N1 9JF, UK. (email:sohawon@zedbooks.demon.co.uk)
  This manual is written for trainers in government and non-governmental development organizations who are preparing their staff to work together with farmers in developing technologies appropriate to ecological agriculture and using few external inputs. The training is designed to stimulate active learning by participants who draw on their own experience: an approach which mirrors the type of interaction between facilitator and farmers in Participatory Technology Development (PTD). Each of the four parts of this book contains learning units in which key concepts are explained and learning modules are presented, together with sample overheads, case studies, games, role-plays etc. The book grew out of an international workshop of PTD trainers working in developing countries, and has been field-tested by trainers over the past five years. Specific attention is paid to gender issues.

- Williams S, Seed J and Mwau A (1994) **The Oxfam gender training manual.** Oxfam Publishing, Oxford, UK.
  This manual is designed for trainers. It provides practical tools for the training of development workers who are in a position to influence the planning and implementation of development and relief programmes at different levels. The manual also offers an introduction to the basic concepts used in gender analysis and how to apply them practically. The manual combines self-awareness work with the training in methods of gender analysis, and is organised like a training course or workshop. One can select the topics which are appropriate to the needs of the group and thereby implement a series of different courses on gender awareness, analysis and planning.

Further reading related to case studies

Chapter Three: Water for life! Conservation Tillage Project in Masvingo, Zimbabwe

- Hagmann J, Chuma E and Gundani O (1996) **Acknowledging the role of gender in agricultural research and extension; a project experience from Zimbabwe.** German Development Cooperation, Section 04, Strategic Corporate Development, Eschborn, Germany.

- Hagmann J (1993) **Farmer participatory research in conservation tillage: approach, methods and experiences from an adaptive on-farm trial programme in Zimbabwe.** In Kronen M (ed) Proceedings of the Fourth Annual Scientific Conference of the SADC Land and Water Management Research Programme, Southern Africa Centre for Co-ordination of Agricultural Research (SACCAR), Gaborone, Botswana.

- Hagmann J, Chuma E and Gundani O (1995) **Integrating formal research into a participatory process.** ILEIA Newsletter, Vol 11, No. 2.

- Hagmann J, Chuma E and Murwira K (1996) **Improving the output of agricultural extension and research through participatory innovation development and extension.** European Journal of Agricultural Education and Extension, Vol. 2, No. 3.

- Chuma E (1996) **The contribution of evaluation methods to understanding adoption of innovations in Zimbabwe.** In Budelman A (ed) Agricultural Research and Development at the Crossroads: Merging systems research and social actor approaches. KIT Publications, Amsterdam.

Chapter Five: Space to listen, in order to learn: shea butter production in Ghana

- Appleton H (ed) 1995 **Do It Herself: Women and Technical Innovation.** IT Publications, London.

Co

For most African agricultural engineers working in development, there is nothing new in the objective 'to make each and every farmer count'. Most development workers are quite committed to this goal. It is rarely a project's intention that only a few farmers benefit from its interventions, while others lag behind or become even more disadvantaged because of such development.

Experienced agricultural engineers are familiar with the many stories of development interventions which have only benefited the rich farmers, and have not reached the poor; that have reached the land owners, but not the landless; that have helped the urban people, but have left behind the rural population; and that have reached men, but bypassed the women. Nowadays, most development workers are committed to changing this inequality of impact in their own projects.

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